z/OS

Infoprint Server Operation and Administration

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Infoprint Server Operation and Administration

Fourth Edition (April 2002)

This edition is a major revision of S544-5745-02. It applies to z/OS Version 1 Release 2, Program Number 5694-A01; to z/OS.e Version 1 Release 3, Program Number 5655-G52; to Infoprint Server Transforms Version 1 Release 1 Modification Level 1, Program Number 5697-F51; and to all subsequent releases and modifications until otherwise indicated in new editions or technical newsletters. Be sure to use the correct edition for the level of the product.

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Summary of Changes

Summary of Changes
for S544–5745-03
z/OS™ Version 1 Release 2

The book contains information previously presented in S544-5745-02, which supports z/OS Version 1 Release 2.

This book describes functions that have been added in PTFs after the initial release of z/OS V1R2. Ensure that your installation has applied the following Infoprint Server PTFs; otherwise, some information in this book might not be accurate for your system.
- PTF UW85178
- PTF UW88108
- PTF UW88209

New Information
- Information is added to indicate this book supports z/OS.e™.
- The new Print Interface subsystem lets z/OS batch applications use Print Interface to transform output data and write it to the JES spool. The following sections describe the operational and administrative tasks required to use this subsystem:
  - Chapter 3, "Starting and Stopping Infoprint Server Daemons" on page 29 describes how to start and stop the Print Interface subsystem.
  - "Using the Print Interface Subsystem" on page 112 describes how to create printer definitions for use with the Print Interface subsystem.
  - "Creating the Infoprint Server Default Printer Definition" on page 118 describes how to create a default printer definition for the Print Interface subsystem and **lp** command.
  - "Locating Output Data Sets Allocated by Infoprint Server" on page 59 describes the job name, job ID, owner, and data set name of sysout data sets that the Print Interface subsystem allocates on the JES spool.
  - Chapter 18, "Using Accounting Information in SMF Type 6 Records" on page 357 describes values in the SMF type 6 records written for data sets that the Print Interface subsystem allocates on the JES spool.

  Apply the PTF for Infoprint® Server APAR OW53202 to obtain this new function.
- The IP PrintWay™ resubmit for filtering function now uses the original job name and JES-assigned job ID when Print Interface allocates a second sysout data set on the JES spool. This lets the operator use the original job name and job ID to find the data set on the JES spool. The following sections describe this support:
  - "Locating Output Data Sets Allocated by Infoprint Server" on page 59 describes the job name, job ID, owner, and data set name of all sysout data sets that Print Interface allocates on the JES spool, including those that IP PrintWay resubmits to Print Interface for filtering.
  - Chapter 18, "Using Accounting Information in SMF Type 6 Records" on page 357 describes values in the SMF type 6 records written for data sets that have been resubmitted to Print Interface for filtering.

  Apply Infoprint Server PTF UW87646 to obtain this new function.

- IP PrintWay now lets you specify how long to wait for TCP/IP to connect to a printer. The following sections describe this support:
  - "Handling Unsuccessful Data Transmissions" on page 170 describes the new **Connection timeout** field in the printer definition and provides guidelines for setting the timeout value.
  - "Attributes for PrintWay Options Object Class" on page 321 describes the new **connection-timeout** attribute, which you can specify if you use the Printer Inventory Definition Utility (PIDU) to edit printer definitions.

  Apply the PTFs for Infoprint Server APARs OW53883 and OW54098 to obtain this new function.

Summary of Changes
for S544–5745-02
z/OS Version 1 Release 2

The book contains information previously presented in S544-5745-01, which supports z/OS Version 1 Release 2.

New Information
- IP PrintWay now lets you send print output to an e-mail destination instead of to a printer. The following sections contain information related to e-mail support:
  - "Starting Sendmail" on page 48 describes how to start z/OS UNIX® sendmail.
  - "Resetting a Transmission-Queue Entry" on page 52 describes how to retransmit a print job that IP PrintWay has retained on the JES spool to a different e-mail destination.
  - "Viewing z/OS UNIX Sendmail Messages" on page 64 describes how to find error messages issued by the z/OS UNIX sendmail function.
  - "Selecting the E-mail Protocol" on page 156 describes how to fill in the ISPF printer definition panels to send output to an e-mail destination. This section also describes how to modify an existing printer definition for a printer in order to send output to an e-mail destination instead.
  - "Creating an IP PrintWay Printer Definition for the E-mail Protocol" on page 248 shows an example of a PIDU **create** command that creates a printer definition for the e-mail protocol.
  - "Attributes for Protocol Object Class" on page 345 describes the following new printer attributes and values, which you can use with the Printer Inventory Definition Utility (PIDU):
    - The **email-to-address** attribute lets you specify one or more e-mail addresses.
    - The **email** value for the **protocol-type** attribute lets you select the e-mail protocol.
  - "E-mail Protocol" on page 381 shows the new E-mail Protocol ISPF panel.
  - "Creating an IP PrintWay Printer Definition for the E-mail Protocol" on page 403 shows an example of a complete printer definition for an e-mail destination.

  Apply Infoprint Server PTFs UW85325 and UW85327 to obtain this new function.
- The Print Interface remote transform function now lets you use the PostScript and PDF to AFP™ color transform provided by Infoprint Manager for AIX®. This AIX transform lets you print color PostScript and color PDF files on the IBM® Infoprint Color 130 Plus printer. "Transforming Data Remotely with Infoprint

Manager for AIX or Windows NT/2000" on page 104 describes the following options and values on the Print Interface remote transform filter:

– The new **fs45** value for the **-a** option lets you create FS45 image output, which the IBM Infoprint Color 130 printer requires.

– The new **-q** option lets you specify transform attributes that customize the color transform.

Apply Infoprint Server PTF UW85327 to obtain this new function.

- IP PrintWay now lets you print data unchanged to a VTAM-controlled printer and, optionally, send the unchanged data to the printer as transparent data. The following sections describe this new support:

– "Selecting the VTAM Protocol" on page 152 describes how to fill in the new **Send as transparent data** field in the printer definition.

– "Printing Data Without Formatting" on page 185 describes how to select the **None** formatting option when printing to a VTAM-controlled printer.

– "Attributes for Protocol Object Class" on page 345 describes the new **send-as-transparent** attribute, which you can use with the Printer Inventory Definition Utility (PIDU).

Apply the following PTFs to obtain this new function:

– Infoprint Server PTFs UW82899 and UW82940

– Infoprint Server Transforms PTF UW82927

- "Converting Line Data to an SCS or DSC/DSE Data Stream" on page 181 describes new support in IP PrintWay for VTAM-controlled printers. IP PrintWay can now:

– Add an end-of-line control to the end of each line. In the printer definition, you can specify the control to add.

– Delete form feed controls from the beginning and end of the data to eliminate extra blank pages. In the printer definition, you can specify the type of form feeds (leading, trailing, or both) to delete.

Apply the following PTFs to obtain these new functions:

– End-of-line function: Infoprint Server PTFs UW82899 and UW82940

– Delete form feed function:

- Infoprint Server PTF UW85178

- Infoprint Server Transforms PTF UW85179

- IP PrintWay now passes the value specified in the TITLE JCL parameter to the target LPD. The value in the TITLE JCL parameter overrides the value you specify in the **Title** field on the LPR Protocol panel. The LPD can print the title value on the banner page. The ISPF field help for the **Title** field and "lpr-title" on page 350 describe this change.

- You can now specify how many resources PSF is to retain in storage in the PSF for OS/390® FSA definition instead of in a PSF exit. You can specify the count of retained resources in new ISPF panel fields or in new printer attributes, which you can use with the Printer Inventory Definition Utility (PIDU). "Attributes for FSA Object Class" on page 292 describes the following new printer attributes:

– **retained-fonts**

– **retained-form-definitions**

– **retained-object-containers**

– **retained-page-definitions**

– **retained-page-segments**

– **save-printer-information**

Also, refer to *PSF for OS/390 & z/OS: Customization* for information about these fields.

Apply Infoprint Server PTF UW83615 to obtain this new function.

- A new appendix describes accessibility features of Infoprint Server.

Deleted Information

- If you use the remote transform function, you no longer need to identify the Infoprint Manager version when you invoke the transform because Infoprint Server no longer supports transforms on unsupported levels of Infoprint Manager. Therefore, the **-v** option has been removed from the Print Interface remote transform filter options in "Transforming Data Remotely with Infoprint Manager for AIX or Windows NT/2000" on page 104. You can, however, continue to specify the **-v** option in a printer definition.
- The glossary has been removed and is now located in *z/OS Infoprint Server Customization*.

Summary of Changes
for S544–5745-01
z/OS Version 1 Release 2

The book contains information previously presented in S544-5745-00, which supports z/OS Version 1 Release 1.

New Information

- Infoprint Server has made the environment variables used by Infoprint Server daemons more secure. As a result, your installation now might need to specify environment variables in the **aopstart** EXEC and also customize the AOPSTART JCL procedure before the operator starts Infoprint Server daemons. Also, new options on the AOPSTOP JCL procedure now let the operator stop individual daemons. Chapter 3, "Starting and Stopping Infoprint Server Daemons" on page 29 describes the new procedures and requirements. Refer to *z/OS Infoprint Server Customization* for information about how to edit the **aopstart** EXEC.
- "Redirecting Output Data Sets on the JES Spool to a Different IP PrintWay Printer" on page 60 describes how to redirect output data sets that NetSpool™ and Print Interface allocate on the JES spool to other printers.
- IP PrintWay now lets the operator test whether a connection to a TCP/IP-attached printer can be established. The operator can perform this function directly from the IP PrintWay Transmission Queue ISPF panel. "Querying the Status of a Print Queue" on page 57 describes this support.
- NetSpool can now convert SCS and 3270 print data streams created by your VTAM® applications (such as CICS® or IMS™) directly to PCL data streams. The following sections describe this support:
  - "Converting SCS and 3270 Data Streams to PCL Data Streams" on page 129 describes how to fill in fields in the printer definition to convert SCS and 3270 data streams to PCL data streams.
  - Chapter 17, "Using the PIDU Program to Manage the Printer Inventory" on page 233 describes the following new and changed attributes you can specify with the Printer Inventory Definition Utility (PIDU):
    - **netspool-formatting** — a changed attribute. The **convert-to-pcl** value is new. The **standard** value is now called **convert-to-line**; however **standard** is still accepted.
    - **pcl-line-density** — a new attribute.
    - **pcl-orientation** — a new attribute.

- **pcl-print-density** — new attribute.
- **scs-automatic-page-orientation** — a new attribute.
  - Appendix B, "ISPF Panels" on page 373 shows the following new and changed fields on the Infoprint Server ISPF panels:
    - **Formatting** — a changed field on the NetSpool Options panel. The **Convert to PCL** option is new. The **Standard** option is now called **Convert to line**.
    - **Line density** — a new field on the Processing panel.
    - **Orientation** — a new field on the Processing panel.
    - **Print density** — a new field on the Processing panel.
    - **SCS automatic page orientation** — a new field on the Processing panel.
  - "Printer Attributes Used by NetSpool" on page 367 lists the additional fields that NetSpool now uses in the printer definition.
- "Selecting a Font" on page 137 describes how to select a fixed-pitch, scalable font to print data that NetSpool has formatted into pages.
- IP PrintWay can now print multiple copies of a data set on any printer that contains an LPD or supports the direct sockets printing protocol. The following sections describe this support:
  - "Selecting the LPR Protocol" on page 146 and "Selecting the Direct Sockets Protocol" on page 149 describe the copy support and how to fill in the new **Optimize copies** field in the printer definition when you select the LPR protocol.
  - "Specifying Printer Commands for Printing Copies" on page 187 describes how to specify printer commands to force each copy to start on a new sheet of paper.
  - "Validating That Documents Can Print as Requested" on page 190 describes how to specify the maximum number of copies that IP PrintWay can print in the **Maximum copies** field of the printer definition. Also, IP PrintWay now includes the number of bytes in all copies when it calculates the size of each document to compare against the **Maximum document size** field.
  - Appendix B, "ISPF Panels" on page 373 shows the new **Optimize copies** field on the LPR Protocol panel.
  - Chapter 17, "Using the PIDU Program to Manage the Printer Inventory" on page 233 describes the new **optimize-copies** attribute.
  - "Printer Attributes Used by IP PrintWay" on page 369 lists the additional fields that IP PrintWay now uses in the printer definition.
- You can now specify up to 32640 copies in the **Copies** and **Maximum copies** fields in the printer definition and in the **copies** and **maximum-copies** attributes. This higher copy limit applies only to print requests processed by Print Interface; NetSpool continues to print a maximum of 255 copies. The ISPF online help describes the new support for the **Copies** and **Maximum copies** fields. "Locating Output Data Sets Allocated by Infoprint Server" on page 59 describes how the operator can locate and delete all output groups for the data set on the JES spool.

Changed Information

- The field headings on some Infoprint Server ISPF panels have changed. Appendix B, "ISPF Panels" on page 373 shows the changed ISPF panels.
- The AFP Printer Driver and AFP Viewer plug-in are no longer part of the Infoprint Server Windows® client. Although these two programs are no longer shipped with Infoprint Server, you can still download them from the Printing Systems Division (PSD) Web site at:

  http://www.ibm.com/printers/download.html

Moved Information

- Information previously in section ″Limiting the Size of Data Transmitted″ can be found in the new section "Validating That Documents Can Print as Requested" on page 190. This change was made because IP PrintWay now also limits the number of copies that can be printed.

- Information about how to specify the **aopstart** command in the **/etc/rc** shell script has been moved to *z/OS Infoprint Server Customization*.

This book contains terminology, maintenance, and editorial changes. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.

About This Publication

This publication describes how to operate and administer the following products:

- Infoprint Server, an element of z/OS Version 1 Release 2 (5694–A01), and higher; and z/OS.e Version 1 Release 3 (5655-G52), and higher
- Infoprint Server Transforms Version 1 Release 1 Modification Level 1, a separate IBM licensed product (5697-F51)

Who Should Use This Publication

This publication is intended for the following audiences:

- System operators who need to start and stop Infoprint Server daemons, NetSpool, or IP PrintWay
- Administrators who need to create entries in the Infoprint Server Printer Inventory, define NetSpool printer logical units to VTAM, and understand accounting records written by IP PrintWay and PSF

The reader should be familiar with z/OS UNIX System Services, TCP/IP, VTAM, and the Job entry subsystem (JES).

Notes:

1. VTAM refers to the Communications Server SNA Services element of z/OS.
2. TCP/IP refers to the Communications Server IP Services element of z/OS.

How This Publication is Organized

This publication is divided into the following parts:

1. "**Part 1. Introduction**" introduces Infoprint Server and describes how the different components of Infoprint Server fit into your system and the functions each component provides.
2. "**Part 2. Operation**" is directed primarily to the operator and describes how to start and stop Infoprint Server. The following chapters are included:
   - Chapter 2 directs you to the chapters in this publication that describe the operational tasks that are required for each component of Infoprint Server.
   - Chapters 3 through 5 describe how to start and stop Infoprint Server daemons, NetSpool, and IP PrintWay.
   - Chapter 6 describes how to manage the IP PrintWay transmission queue.
   - Chapter 7 describes how to work with output data sets on the JES spool that were allocated by either Print Interface or NetSpool.
   - Chapter 8 describes how to find and view messages issued by NetSpool, IP PrintWay, and other components of Infoprint Server.
3. "**Part 3. Administration**" is directed primarily to the administrator and describes how to create entries in the Printer Inventory for use by different components of Infoprint Server. It also describes other administrative tasks. The following chapters are included:
   - Chapter 9 directs you to the chapters in this publication that describe the administrative tasks that are required for each component of Infoprint Server.
   - Chapter 10 describes the types of entries you can create in the Printer Inventory.

- Chapters 11 through 14 describe how to create entries in the Printer Inventory for Print Interface, NetSpool, and IP PrintWay and Infoprint Server Transforms. Read the chapters that apply to your installation.
- Chapter 15 describes how to define NetSpool printer logical units (LUs) to VTAM.
- Chapter 16 describes how to use ISPF panels to manage the Printer Inventory. Read this chapter if you have difficulty using the Infoprint Server ISPF panels. Most readers can skip this chapter and use the online help to navigate the ISPF panels.
- Chapter 17 describes how to use the Printer Inventory Definition Utility (PIDU) program to manage the Printer Inventory.
- Chapter 18 describes the accounting record (SMF type 6) that IP PrintWay creates.

4. "**Part 4. Appendixes**" contains the following reference information:
   - Appendix A contains tables that list the fields on the Infoprint Server ISPF panels that are used by the Print Interface, NetSpool, or IP PrintWay component of Infoprint Server. Use these tables to help you create printer definitions for use by a particular component.
   - Appendix B contains sample screens of the Infoprint Server ISPF panels.
   - Appendix C describes the options that IP PrintWay transmits with a document to Infoprint Manager for AIX or Infoprint Manager for Windows NT.
   - Appendix D contains sample printer definitions filled in for use by IP PrintWay, Print Interface, and NetSpool.
   - Appendix E describes accessibility features.

A bibliography lists all Infoprint Server publications and other related publications.

The Infoprint Server glossary is located in *z/OS Infoprint Server Customization*.

Where to Find More Information

This section describes where to find information related to z/OS, Infoprint Server, and Infoprint Server Transforms.

Web Sites

These Web sites contain related information:

- http://www.ibm.com/printers/

  This site contains information about printing products, including:

  - An overview of Infoprint Server, including the same printing scenarios that you can find in *z/OS Infoprint Server Introduction*.
  - Infoprint Server publications and other publications related to printing. These publications are in PDF format.

- http://www.ibm.com/printers/download.html

  This site contains downloads for Windows systems, including the Infoprint Port Monitor, the AFP Viewer plug-in, the AFP Printer Driver, and Network Printer Manager (NPM) for the Web.

- http://www.ibm.com/servers/eserver/zseries/zos/

  This site contains information about z/OS.

- http://www.ibm.com/servers/eserver/zseries/zos/bkserv/

  This site contains z/OS documentation, including:

  - All z/OS publications in both PDF and BookManager format.
  - Documentation updates that result from APARs and PTFs.

- http://ibm.com/redbooks

  This site contains IBM redbooks, including a redbook for Infoprint Server.
- http://www.ibm.com/servers/eserver/zseries/zos/unix/

  This site contains information about z/OS UNIX System Services.

Accessing Licensed Books on the Web

z/OS licensed documentation in PDF format is available on the Internet at the IBM Resource Link Web site at:

`http://www.ibm.com/servers/resourcelink/`

Licensed books are available only to customers with a z/OS license. Access to these books requires an IBM Resource Link Web userid and password, and a key code. With your z/OS order you received a memo that includes this key code.

To obtain your IBM Resource Link Web userid and password log on to:

`http://www.ibm.com/servers/resourcelink/`

To register for access to the z/OS licensed books:
1. Log on to Resource Link using your Resource Link userid and password.
2. Click on **User Profiles** located on the left-hand navigation bar.
3. Click on **Access Profile.**
4. Click on **Request Access to Licensed books.**
5. Supply your key code where requested and click on the **Submit** button.

If you supplied the correct key code you will receive confirmation that your request is being processed. After your request is processed you will receive an e-mail confirmation.

Note: You cannot access the z/OS licensed books unless you have registered for access to them and received an e-mail confirmation informing you that your request has been processed.

To access the licensed books:
1. Log on to Resource Link using your Resource Link userid and password.
2. Click on **Library**.
3. Click on **zSeries**.
4. Click on **Software**.
5. Click on **z/OS**.
6. Access the licensed book by selecting the appropriate element.

Using LookAt to look up message explanations

LookAt is an online facility that allows you to look up explanations for most of the z/OS, z/VM, and VSE messages you encounter, as well as system abends and some codes. Using LookAt to find information is faster than a conventional search because in most cases LookAt goes directly to the message explanation.

You can access LookAt from the Internet at:

`http://www.ibm.com/servers/eserver/zseries/zos/bkserv/lookat/`

or from anywhere in z/OS where you can access a TSO command line (for example, TSO prompt, ISPF, z/OS UNIX System Services running OMVS). You can

also download code from the *z/OS Collection* (SK3T-4269) and the LookAt Web site so you can access LookAt from a PalmPilot (Palm VIIx suggested).

To use LookAt on the Internet to find a message explanation, go to the LookAt Web site and simply enter the message identifier (for example, `$HASP701` or `$HASP*`). You can select a specific release to narrow your search.

To use LookAt as a TSO command, you must have LookAt installed on your host system. You can obtain the LookAt code for TSO from a disk on your *z/OS Collection* (SK3T-4269) or from the LookAt Web site. To obtain the code from the LookAt Web site, do the following:

1. Go to http://www.ibm.com/servers/eserver/zseries/zos/bkserv/lookat/.
2. Click **News**.
3. Scroll to **Download LookAt Code for TSO and z/VM.**
4. Click the ftp link, which will take you to a list of operating systems. Click the appropriate operating system. Then click the appropriate release.
5. Open the **lookat.me** file and follow its detailed instructions.

After you have LookAt installed, you can access a message explanation from a TSO command line by entering: **lookat** *message-id*. LookAt will display the message explanation for the message requested.

Note: Some messages have information in more than one book. For example, IEC192I can be found in *z/OS MVS System Messages, Vol 7 (IEB-IEE)* and also in *z/OS MVS Routing and Descriptor Codes.* For such messages, LookAt displays a list of books in which the message appears. You can then select one of the books to view the message explanation.

Preventive Service Planning Information

Before installing Infoprint Server, you should review the current Preventive Service Planning (PSP) information, also called the PSP bucket. You should also periodically review the current PSP information. The PSP upgrade ID is: ZOSV1R2; the subset for Infoprint Server is: INFOPRINT.

To obtain the current PSP bucket, contact the IBM Support Center or use z/OS SoftwareXcel (IBMLink). If you obtained z/OS as part of a CBPDO, HOLDDATA and PSP information is included on the CBPDO tape; however, this information might not be current if the CBPDO tape was shipped several weeks prior to installation.

Publications

See "Bibliography" on page 415 for a list of the publications referred to in this book and publications that contain additional information about related products. For titles and order numbers of the books for *all* products that are part of z/OS, refer to *z/OS Information Roadmap.*

Infoprint Server for z/OS Implementation Redbook, SG24-6234, is available on the Web at: `http://ibm.com/redbooks`

Table 1 on page xxv summarizes the publications in the Infoprint Server product library.

Table 1. Summary of Infoprint Server Publications

Publication	Form number
z/OS Infoprint Server Introduction	S544-5742
Introduces all components of Infoprint Server, including IP PrintWay, NetSpool, and Print Interface. It also introduces Infoprint Server Transforms. This publication contains printing scenarios that show how you can use Infoprint Server in your installation.	
z/OS Infoprint Server Migration	G544-5743
Summarizes the new function in Infoprint Server and Infoprint Server Transforms and describes the migration tasks required to implement each new function in your installation. It also describes the Infoprint Server migration program, which converts IP PrintWay, NetSpool, and Print Interface printer information to the format required by Infoprint Server for OS/390 V2R8 and higher.	
z/OS Infoprint Server Customization	S544-5744
Describes customization tasks for all components of Infoprint Server, including IP PrintWay, NetSpool, and Print Interface. It also describes customization tasks for Infoprint Server Transforms. This publication describes required environment variables, configuration files, startup procedures, how to write exit routines and filter programs, and how to use the Infoprint Server API.	
z/OS Infoprint Server Operation and Administration	S544-5745
Describes operator procedures and administrative tasks for all components of Infoprint Server, including IP PrintWay, NetSpool, and Print Interface. This publication describes how to start and stop Infoprint Server and how the operator can manage the IP PrintWay transmission queue. It describes how the administrator can create entries in the Printer Inventory using either ISPF panels or the Printer Inventory Definition Utility (PIDU) program, define NetSpool printer LUs to VTAM, and use accounting records written by IP PrintWay.	
z/OS Infoprint Server User's Guide	S544-5746
Describes how to submit print jobs from remote systems (including Windows systems), the local z/OS system, and Virtual Telecommunications Access Method (VTAM) applications. It describes these z/OS UNIX commands: **afp2pcl**, **afp2pdf**, **afp2ps**, **cancel**, **lp**, **lpstat**, **pcl2afp**, **pdf2afp**, **ps2afp**, and **sap2afp**; the AOPPRINT JCL procedure; the AOPBATCH program; DD and OUTPUT JCL parameters supported by Infoprint Server; and how to download and install the Infoprint Port Monitor for Windows.	
z/OS Infoprint Server Messages and Diagnosis	G544-5747
Describes messages issued by all components of Infoprint Server, including IP PrintWay, NetSpool, and Print Interface. It also describes Infoprint Server Transforms messages and how to use Infoprint Server tracing facilities to diagnose and report errors.	

Understanding Syntax Notation

The following rules apply to coding illustrations throughout this publication:

- Uppercase or bold letters are to be coded as shown.

- Variable data is printed in italics. Enter specific data to replace the characters in italics.
- Except for braces, do not enter the following symbols as part of a parameter or option:

Vertical Bar |

Underscore   ___

Brackets   [ ]

Braces   { }

- A vertical bar between two values means that you select one of the values.
- An underscored value means that if an option is not specified, the underscored value, called the default, is used.
- Brackets around a value mean that you do not have to select the value.
- Braces around a value can mean that you must select one of the values. However, in some statements, you must enter the braces. The text identifies when the braces are required.

Part 1. Introduction

1

Chapter 1. Introducing Infoprint Server

Infoprint Server and Infoprint Server Transforms provide support for LAN and host printing on your z/OS system. Figure 1 shows how the components of Infoprint Server and Infoprint Server Transforms fit into your system. The components of Infoprint Server and Infoprint Server Transforms are shaded. (When you view the PDF file, the components of Infoprint Server are yellow, and the components of Infoprint Server Transforms are blue.) Following the figure is a description of each component.
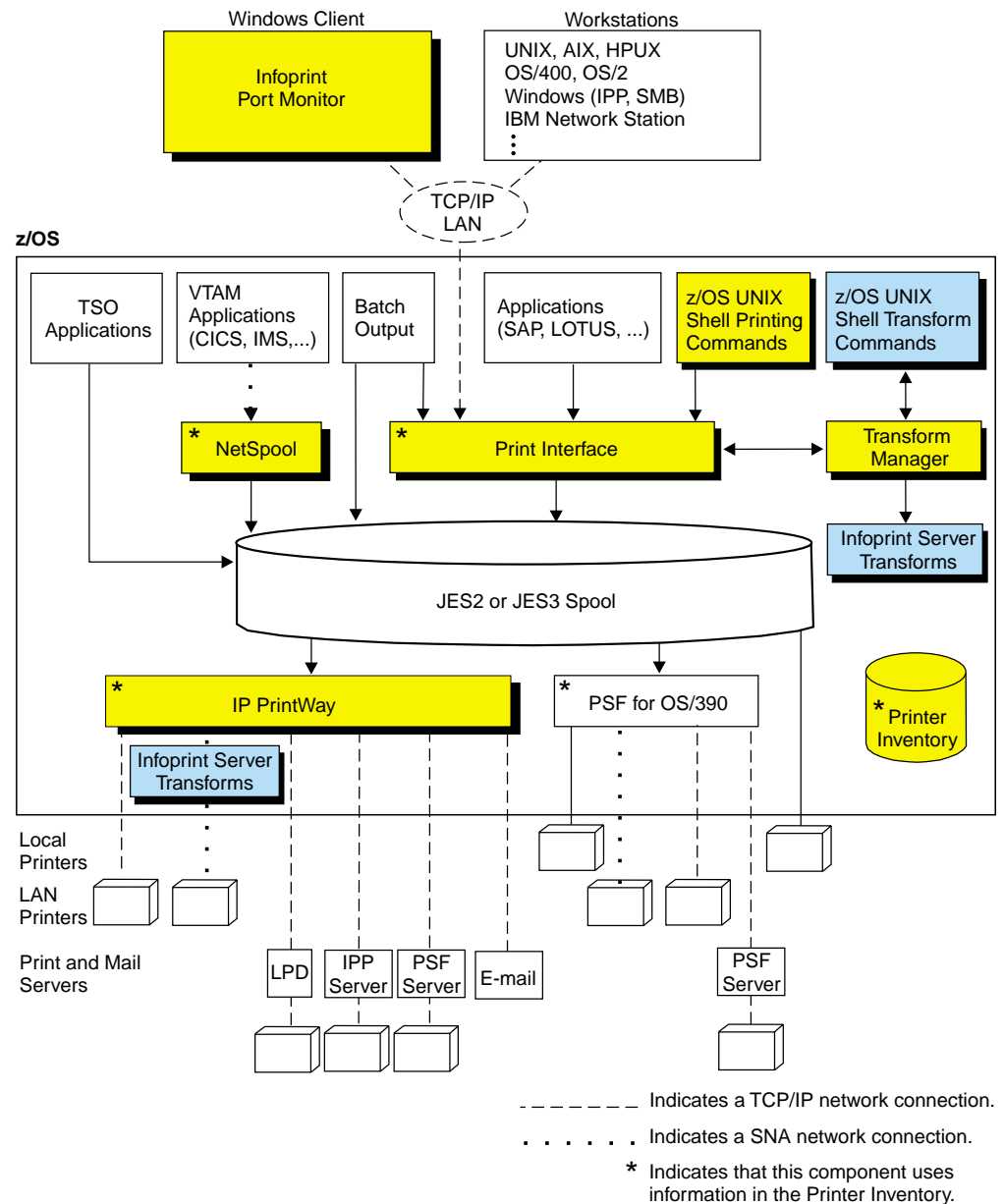
Figure 1. Infoprint Server and Infoprint Server Transforms System Diagram

Printer Inventory and Printer Inventory Manager
> The Printer Inventory Manager component of Infoprint Server controls the Printer Inventory. The Printer Inventory consists of files in the hierarchical file system (HFS) that contain information about each printer and each e-mail destination. The Printer Inventory also contains system configuration information for IP PrintWay. Optionally, the Printer Inventory can contain system configuration information for PSF for OS/390.

Infoprint Server Windows Client
> The Infoprint Server Windows client consists of the Infoprint Port Monitor, which runs on a Windows system and automatically sends print requests and job attributes to the Print Interface component of Infoprint Server running on the z/OS system.

Print Interface
> The Print Interface component of Infoprint Server processes print requests from remote clients and from the local z/OS system. Print Interface accepts several different data formats, converts data between EBCDIC and ASCII, transforms data to a format accepted by the printer, and allocates output data sets on the JES spool.

Infoprint Server Transforms
> Infoprint Server Transforms, a separate licensed program product (5697-F51), provides transforms that convert data from one format to another on the local z/OS system.

Transform Manager
> The Infoprint Server Transform Manager component of Infoprint Server manages many of the transforms provided by Infoprint Server Transforms.

NetSpool
> The NetSpool component of Infoprint Server processes print requests from VTAM applications, such as CICS and IMS. NetSpool accepts SCS, 3270, and binary data streams, converts SCS and 3270 data streams to either line data streams or PCL data streams, and allocates output data sets on the JES spool.

IP PrintWay
> The IP PrintWay component of Infoprint Server transmits data sets from the JES spool to printers or print servers in a TCP/IP or SNA network. IP PrintWay also can transmit data sets to e-mail destinations.

Simple Network Management Protocol (SNMP) subagent (not shown in figure)
> The SNMP subagent of Infoprint Server lets you use an SNMP manager to view printer characteristics and printer status for printers controlled by PSF for OS/390 that do not have internal SNMP agents or are not TCP/IP-attached to PSF.

PSF for OS/390 (a separate product)
> PSF for OS/390 (5655–B17) is a separate product that can print output on IBM AFP printers. The PSF system programmer can specify PSF printer configuration information in the Printer Inventory that PSF can use when it starts a printer. For information about how to customize PSF to use the Printer Inventory, refer to *PSF for OS/390 & z/OS: Customization*.

The following sections describe each of the Infoprint Server components in more detail.

Printer Inventory Manager

The Printer Inventory Manager component of Infoprint Server controls the Printer Inventory. The Printer Inventory consists of HFS files that contain information about the printing environment. The administrator must create and manage information in the Printer Inventory.

Note: The Printer Inventory *cannot* be shared by Infoprint Server running at the same or different levels on other systems.

The administrator can create the following objects in the Printer Inventory:

- Printer definitions, which contain information about printers and e-mail destinations.
- Printer pool definitions, which contain information about groups of printers and e-mail destinations to which NetSpool can broadcast data.
- FSS definitions, which contain configuration information for IP PrintWay functional subsystems (FSSs). Optionally, the administrator can create FSS definitions for PSF for OS/390 FSSs.
- FSA definitions, which contain configuration information for IP PrintWay functional subsystem applications (FSAs). Optionally, the administrator can create FSA definitions for PSF for OS/390 FSAs.

Figure 2 shows how the administrator can create definitions in the Printer Inventory and which components of Infoprint Server use the Printer Inventory.
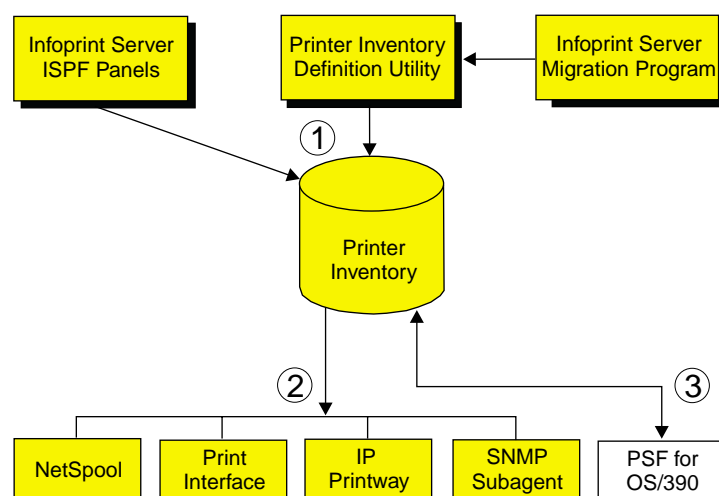
Figure 2. Printer Inventory Manager

1. The administrator can use Infoprint Server ISPF panels and the Printer Inventory Definition Utility (PIDU) to create and maintain the Printer Inventory. The PIDU is useful for creating many printer definitions at the same time and for backing up the Printer Inventory.
2. The following Infoprint Server components use information in the Printer Inventory:
   - NetSpool uses information in printer definitions and in printer pool definitions.
   - Print Interface uses information in printer definitions.
   - IP PrintWay uses information in printer definitions. IP PrintWay also uses configuration information in FSS and FSA definitions.

- The SNMP subagent uses printer information that PSF for OS/390 stores in the Printer Inventory about PSF printers.

3. PSF for OS/390, a separate product, can optionally use printer configuration information that the PSF system programmer specifies in FSS and FSA definitions in the Printer Inventory.

   The printer configuration information in the FSS and FSA definitions is the same as the configuration information that the system programmer can alternatively specify in PSF startup procedures and PSF exits. When the printer configuration information is specified in the Printer Inventory, however, the PSF system programmer can change it without restarting all PSF printers in the PSF functional subsystem (FSS); only the PSF printers with changed configuration information need to be restarted.

   For information about how the PSF system programmer can customize PSF for OS/390 to use the Printer Inventory, refer to *PSF for OS/390 & z/OS: Customization.*

Additional functions provided by the Printer Inventory Manager are:

- **Migration program**

  The Infoprint Server migration program helps the administrator migrate from earlier releases of IP PrintWay, NetSpool, and the OS/390 Print Server. The migration program merges printer information formerly specified in NetSpool print characteristics data sets, NetSpool tables, NetSpool startup procedures, IP PrintWay routing and options data sets, and the Print Interface printer inventory to create entries (such as printer definitions and printer pool definitions) in the new Infoprint Server Printer Inventory.

  The migration program can also move printer information located in PSF startup procedures to FSS and FSA definitions in the Printer Inventory.

- **Security**

  The administrator must restrict access to the Printer Inventory and to the operator commands that start and stop the Printer Inventory Manager, the Print Interface LPD, the Print Interface IPP server, the Transform Manager, and the SNMP subagent.

Windows Client

The Infoprint Server Windows client consists of the following program that runs on Windows 95/98, NT, and 2000 systems:

Infoprint Port Monitor for Windows

    The Infoprint Port Monitor for Windows lets users print documents using standard print-submission methods from any Windows application that supports printing. After the Infoprint Port Monitor for Windows is installed and configured on the Windows system, the Port Monitor automatically sends documents to the Print Interface component of Infoprint Server.

    Note: Infoprint Server also supports printing from a Windows system with the SMB protocol and the IPP protocol. To use these protocols, Windows users do not need to install the Infoprint Port Monitor for Windows.

The following related products also run on Windows 95/98, NT, and 2000 systems. Although they are *not* part of the Infoprint Server Windows client, you might want to use them if your installation has IBM AFP printers or AFP documents.

- **AFP Printer Driver for Windows**

  The AFP Printer Driver creates output files in AFP format. Files in AFP format can be printed on IBM AFP printers. The AFP Printer Driver can create output files that contain documents, overlays, or page segments. It can also create inline form definitions for printing documents with special options, such as printing on both sides of the paper.

- **AFP Viewer Plug-in for Windows**

  The AFP Viewer plug-in lets you view documents in AFP format, for example documents downloaded from the z/OS system or documents on the Web. The AFP Viewer plug-in also lets you print AFP documents to IBM AFP printers as well as non-AFP printers.

The Infoprint Port Monitor for Windows is shipped with Infoprint Server. You can also download the Infoprint Port Monitor for Windows, the AFP Printer Driver for Windows, and the AFP Viewer plug-in for Windows directly to your Windows systems from the IBM Printing Systems Division (PSD) Web site: http://www.ibm.com/printers/download.html.

Print Interface

The Print Interface component of Infoprint Server processes print requests received from both remote clients and local users. Figure 3 on page 8 shows the steps that occur from the time Print Interface receives a print request until it allocates an output data set on the JES spool. An explanation of each step follows.

Windows Client

Workstations

Infoprint
Port Monitor

UNIX, AIX, HPUX
OS/400, OS/2
Windows (IPP, SMB)
IBM Network Station

① TCP/IP
LAN

z/OS

z/OS SMB
Server

Batch
Output

Applications
(SAP, LOTUS, ...)

z/OS UNIX
Shell Printing
Commands

②

④ ③ Print Interface ⑤ Transform
Manager

Printer
Inventory

⑥ Infoprint Server
Transforms

JES2
or
JES3
Spool

– – – – – Indicates a TCP/IP network connection.
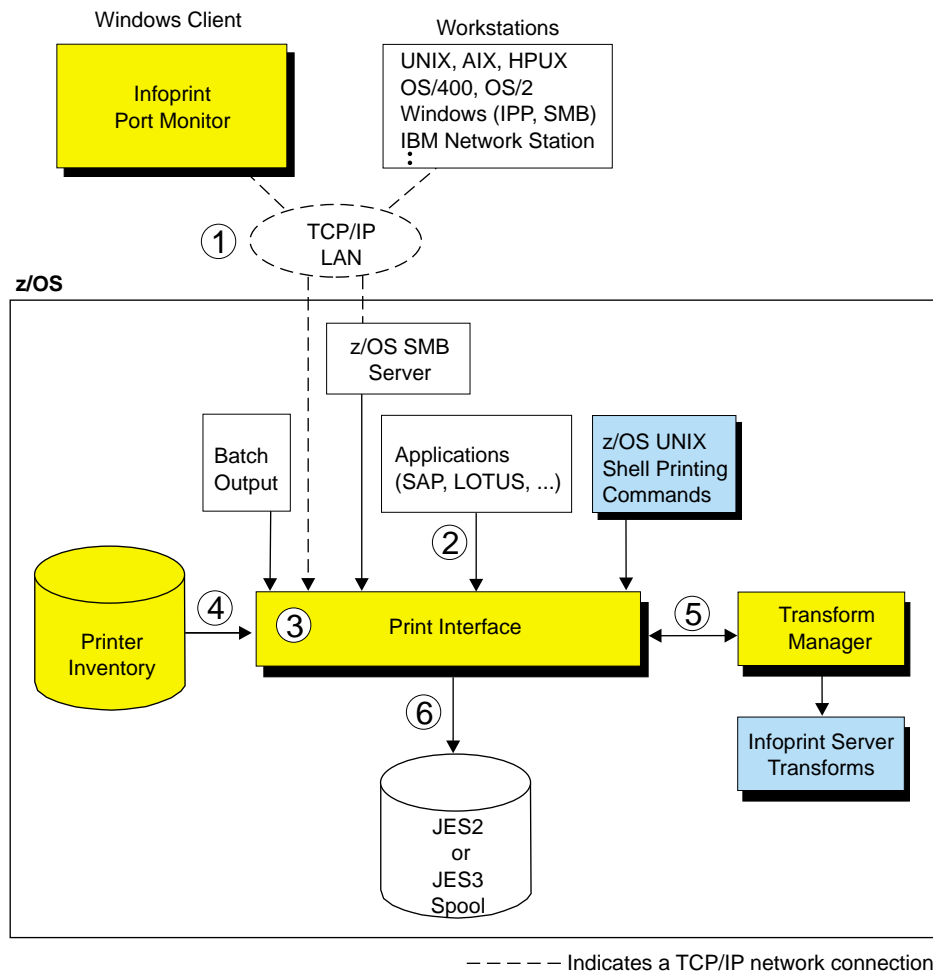
Figure 3. Print Interface System Diagram

1. Users can submit print requests and query job status from remote clients in the TCP/IP network, using one of the following TCP/IP protocols:
   - LPR protocol: The LPR protocol is defined by RFC 1179. Clients that use this protocol include:
     - The Infoprint Port Monitor for Windows; Infoprint Server provides this client.
     - TCP/IP commands such as **lpr**, **enq**, and **lpq**.
     - An SAP R/3 application server that runs on a remote system.
   - Internet Printing Protocol (IPP): IPP is a standard protocol for printing over the Internet. An IPP client must run in the remote system.
   - Server Message Block (SMB) printing protocol: SMB is the standard printing protocol used by Windows systems. The z/OS SMB server must be installed on the z/OS system to receive print requests. The z/OS SMB server uses Print Interface callable services to allocate output data sets on the JES spool and return print job status to the client.
2. Users can submit print requests from the local z/OS system using one of the following methods:
   - Print Interface subsystem: Using the Print Interface subsystem, you can transform and print output data created by a batch application with minimal changes to your JCL.

- AOPPRINT: Using the AOPPRINT JCL procedure, you can print existing MVS data sets and UNIX files.
- z/OS UNIX printing commands (**lp**, **lpstat**, and **cancel**) provided by Infoprint Server; Using these commands, which adhere to the XPG4.2 standard, you can print MVS data sets and UNIX files, query the status of a print job, and cancel a print job. You can run these commands from the z/OS UNIX command line or from a UNIX application.
- Infoprint Server SAP Output Management System (OMS). Using the Infoprint Server SAP OMS and the SAP R/3 Application Server for z/OS, SAP R/3 users can submit a print job and receive immediate notification about job events.

3. Print Interface runs as a UNIX application that uses the services of z/OS UNIX System Services.

   Print Interface accepts data in any format, including but not limited to the following formats: line data, MO:DCA-P (also known as AFP), PostScript, PDF, PCL, SAP (OTF and ABAP), and text.

4. Each print request specifies the name of a printer definition in the Printer Inventory. The printer definition can describe a printer or an e-mail destination. Print Interface uses information in the printer definition to determine how to process the data, whether or not to transform the data, and so on.

5. Print Interface can, in most cases, automatically detect the data format of the input data and validate that the printer accepts that data format. Print Interface can convert data to EBCDIC or ASCII. It can also call transforms provided by Infoprint Server Transforms to convert data from one data format to another.

6. For each print request, Print Interface dynamically allocates an output data set on the JES2 or JES3 spool using JES allocation parameters specified in the printer definition, including:

   - JES work-selection parameters, such as class, forms name, and destination. These parameters cause JES to direct the output data sets to the correct JES output writer or functional subsystem application (FSA), such as PSF for OS/390 or IP PrintWay.
   - Advanced Function Presentation (AFP) parameters, such as the name of a form definition and page definition. PSF for OS/390 uses these parameters when printing data on IBM AFP printers.

Some additional functions provided by Print Interface include:

- **Validation of print requests**

  Before accepting print requests, Print Interface can validate, with some exceptions, that the document can print as requested on the selected printer. For example, Print Interface can reject documents with data formats that the printer does not support or that are too large to print on the selected printer.

- **Automatic data transforms**

  Print Interface can, in most cases, automatically detect the input data format and transform data into the format required by the printer or e-mail destination. Print Interface can perform the following data transforms:

  – Print Interface can transform line data (for example, in a sequential data set or a partitioned data set) into text data for printing on a printer such as an IBM network printer.
  – Print Interface can transform text data into line data for printing on an IBM AFP printer.

– Print Interface can transform PCL, PostScript, PDF, and SAP (OTF and ABAP) data into AFP or line data for printing on an IBM AFP printer. The Infoprint Server Transforms product is required.

– Print Interface can transform line data or AFP data into PCL, PostScript, or PDF format. Infoprint Server Transforms is required.

– Print Interface can transform PCL, PDF, and PostScript data to AFP format on an AIX or Windows system. Infoprint Manager V3R2 for AIX or Infoprint Manager V1R1 for Windows NT and Windows 2000 is required. Print Interface can use the color transform provided with Infoprint Manager V3R2 for AIX to transform color PDF and PostScript data to AFP format for printing on an IBM Infoprint Color 130 Plus printer.

- **Notification of completion**

  Print Interface can notify users on the local z/OS system when processing of a document is complete and the data set has been removed from the JES spool. It can also notify users who request mail notification with a command, such as **lpr**, that uses the LPR to LPD protocol.

- **Status reporting**

  Print Interface can report the status of its data sets that are still on the JES spool. It can report if the data set has been selected for processing, held by the system, retained due to a failed transmission to a LAN printer or an e-mail destination, or deleted before printing.

- **Identification of printed output**

  Print Interface retains the user ID of the job submitter for printing on separator pages and for display on the JES spool, so that the user ID can be printed on separator pages and the operator can view the name of the job submitter when the data set is on the JES spool.

- **Double-byte character set (DBCS) support**

  Print Interface can convert DBCS data from one code page to another before writing the data to the JES spool.

- **Filter support**

  An installation can write a filter program to modify data before Print Interface writes the data to an output data set. A filter can be used to add a separator page or modify data. For example, an installation can write a filter to transform data from one format to another.

- **SAP Output Management System (OMS)**

  Print Interface provides an SAP OMS with a Callback daemon to support printing with the SAP R/3 Application Server for z/OS. The OMS and Callback daemon let SAP users print, cancel jobs, obtain job status, and receive immediate notification about job events.

  The SAP-certified functions provided in Print Interface are:
  – OMS Polling Interface
  – OMS/XOM Callback Interface
  – OMS Operations Supplement

  For more information about SAP certification, visit the SAP Web site at `www.sap.com/solutions/compsoft/cspdirectory`. "Print Interface with an SAP R/3 Application Server Running on the Same z/OS System" on page 11 describes this support.

  The Print Interface LPD can print documents received from an SAP R/3 application server running on another system, such as an AIX or Windows NT

system. "Print Interface with the SAP R/3 Application Server Running on a Remote System" on page 12 describes this support.

Print Interface with an SAP R/3 Application Server Running on the Same z/OS System

Figure 4 shows how the Print Interface SAP Output Management System (OMS), Callback daemon, and the SAP R/3 Application Server for z/OS fit into your system. When an SAP R/3 application server runs on the z/OS system, the Print Interface OMS receives print and status requests, and the Callback daemon provides immediate notification of job events. The SAP R/3 Application Server for z/OS and its spool work process must run on the same system as Infoprint Server. The Print Interface Callback daemon can return notification of job events to SAP R/3 application servers running on *other* SAP R/3 systems, provided that the SAP spool work process runs on the z/OS system.
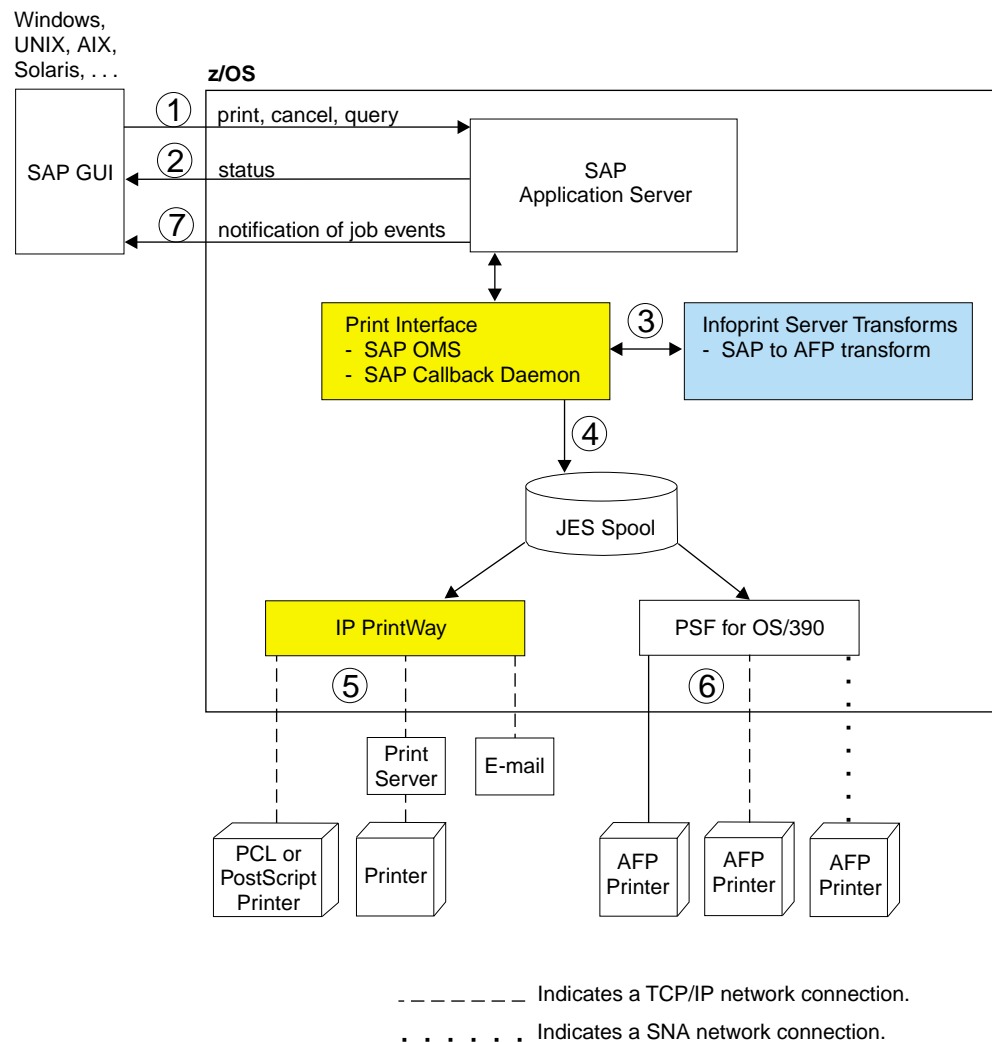
Figure 4. Printing SAP R/3 Documents with the SAP R/3 Application Server Running on a z/OS System

1. From an SAP GUI, users make print, cancel, job query, and device query requests to the SAP R/3 Application Server. These print requests specify the

name of an SAP R/3 output device defined to the SAP R/3 system. The SAP administrator associates each output device with a printer definition in the Infoprint Server Printer Inventory.

2. For a status request, the Print Interface SAP OMS returns the status of a print job or a list of print jobs that the printer is processing.

3. For a print request, Print Interface detects the data format of the input document and performs different processing depending on the type of data:

   - If SAP OTF or ABAP data is to be printed on an AFP printer, Print Interface calls Infoprint Server Transforms to transform the data to AFP format. The SAP to AFP transform uses transform options specified in the printer definition. The administrator must specify the correct transform filter in the printer definition to use transforms.

   - If PCL or PostScript data is to be printed on an IP PrintWay-controlled printer, Print Interface typically does not modify the data; however, the administrator can specify a filter that modifies data in the printer definition.

4. Print Interface creates an output data set on the JES spool. From the JES spool, IP PrintWay, PSF for OS/390, or JES can print the document.

5. IP PrintWay selects data sets from the JES spool and transmits them to remote printers, print servers, or e-mail destinations.

6. PSF for OS/390 selects data sets from the JES spool and prints them on IBM AFP printers. The printers can be local, TCP/IP-attached, or SNA-attached.

7. As print jobs complete (successfully or unsuccessfully), the Print Interface SAP Callback daemon sends notification back to the SAP R/3 system.

Print Interface with the SAP R/3 Application Server Running on a Remote System

Figure 5 on page 13 shows how the Print Interface LPD and an SAP R/3 application server running on a remote system (such as AIX or Windows NT) fit into your system. When no SAP R/3 application server is running on the z/OS system, the Infoprint Server LPD (as opposed to the Infoprint Server OMS) receives print and status requests, and notification of job events does not occur.

Windows,
UNIX, AIX,
Solaris, . . .

Windows,AIX, Solaris, . . .

SAP GUI

① print, cancel, query

② status

SAP
Application Server

z/OS

Print Interface
- LPD

③ Infoprint Server Transforms
- SAP to AFP transform

④

JES Spool

IP PrintWay

⑤

PSF for OS/390

⑥

Print
Server

E-mail

PCL or
PostScript
Printer

Printer

AFP
Printer

AFP
Printer

AFP
Printer

– – – – – – Indicates a TCP/IP network connection.

. . . . . . Indicates a SNA network connection.

Figure 5. Printing SAP R/3 Documents with the SAP R/3 Application Server Running on a Non-z/OS System

1. From an SAP GUI, users make print, cancel, job query, and device query requests to an SAP R/3 application server running on a remote system (such as Windows NT, AIX, or Solaris. These print requests specify the name of an SAP R/3 output device that is defined to the SAP R/3 system. The SAP administrator associates each output device with a printer definition in the Infoprint Server Printer Inventory.

2. For a status request, the Print Interface LPD returns the status of a print job or a list of print jobs that the printer is processing.

3. For a print request, the Print Interface LPD detects the data format of the input document and performs different processing depending on the type of data:

   • If SAP OTF or ABAP data is to be printed on an AFP printer, Print Interface calls Infoprint Server Transforms to transform the data to AFP format. The SAP to AFP transform uses transform options specified in the printer definition. The administrator must configure the printer definition to use transforms and specify transform options.

- If PCL or PostScript data is to be printed on an IP PrintWay-controlled printer, Print Interface typically does not modify the data; however, the administrator can specify a filter that modifies data in the printer definition.

4. Print Interface creates an output data set on the JES spool. From the JES spool, IP PrintWay, PSF for OS/390, or JES can print the document, or IP PrintWay can send it to an e-mail destination.

5. IP PrintWay selects data sets from the JES spool and transmits them to remote printers or print servers or sends them to e-mail destinations.

6. PSF for OS/390 selects data sets from the JES spool and prints them on IBM AFP printers. The printers can be local, TCP/IP-attached, or SNA-attached.

Infoprint Server Transforms

Infoprint Server Transforms is a licensed program product (5697-F51). It provides transforms that convert data from one format to another on the z/OS system. Infoprint Server Transforms consists of the following features:

- **Transforms to AFP**

  This feature consists of the following transforms that convert data streams to monochrome Mixed Object Document Content Architecture for Presentation (MO:DCA-P) data streams, which can be printed on IBM AFP printers:

  – PCL to AFP Transform

    This transform converts Printer Control Language (PCL) 5e data streams to MO:DCA-P data streams.

  – PDF to AFP Transform

    This transform converts Adobe Portable Data Format (PDF) 1.2 data streams to MO:DCA-P data streams.

  – PostScript to AFP Transform

    This transform converts PostScript Language Level 3 data streams to MO:DCA-P data streams.

  – SAP to AFP Transform

    This transform converts (1) SAP R/3 Release 4.6C (and lower releases) Output Text Format (OTF) data streams to MO:DCA-P data streams and (2) SAP R/3 Release 4.6C (and lower releases) Advanced Business Application Programming (ABAP) data streams to line data streams. IBM AFP printers controlled by PSF can print both MO:DCA-P and line data streams.

- **Kanji AFP Print**

  This feature can be used with the PDF to AFP and PostScript to AFP transforms. It lets you print Japanese data streams that use Heisei Kaku Gothic W5 and Heisei Mincho W3 fonts, as well as embedded fonts. These two Heisei fonts, which are provided with this feature, must be installed on the z/OS system. The transform can map some other commonly used Japanese fonts, including Ryumin-Light and Gothic BBB-Medium, to these two Heisei fonts.

- **AFP to PCL Transform**

  This transform converts MO:DCA-P and line data streams to PCL 5, 5e, or 5c (color) data streams.

- **AFP to PDF Transform**

  This transform converts MO:DCA-P and line data streams to PDF 1.2 (monochrome or color) data streams.

- **AFP to PostScript Transform**

  This transform converts MO:DCA-P and line data streams to PostScript Language Level 2 (monochrome or color) data streams.

- **Coax Printer Support**

  This feature converts line data streams to Data Stream Compatibility/Data Stream Extended (DSC/DSE) and SNA Character String (SCS) data streams and in conjunction with IP PrintWay transmits the data to VTAM-controlled printers defined as VTAM LU0, LU1, or LU3 printers.

The Transforms to AFP feature and the Kanji AFP Print feature are available at no additional charge to customers who have purchased Infoprint Server. The other features are separately priced features.

A z/OS UNIX command for each transform lets users transform data in a z/OS UNIX file or MVS data set without printing it. The z/OS UNIX transform command creates an output file, which you can print or transmit to another system for viewing or printing. A filter provided for each transform lets Print Interface transform data before writing it to the JES spool. The z/OS UNIX commands and filters are: **afp2pcl**, **afp2pdf**, **afp2ps**, **pcl2afp**, **ps2afp**, **pdf2afp**, and **sap2afp**.

For more information about each transform, including its limitations, refer to *z/OS Infoprint Server User's Guide*.

Transform Manager

The Transform Manager component of Infoprint Server controls the transform daemons provided with Infoprint Server Transforms. The Transform Manager starts and stops the transform daemons using configuration information specified by the administrator. For example, the administrator can limit the number of transform daemons that are active at a time.

Figure 6 shows how the Transform Manager and Infoprint Server Transforms fit into your system. An explanation of each step follows:
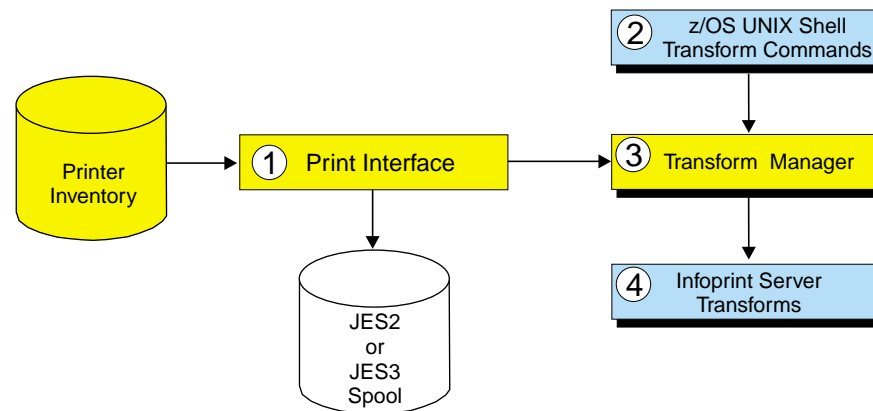
Figure 6. Transform Manager and Infoprint Server Transforms System Diagram

1. Print Interface uses transform filters provided by Infoprint Server Transforms to transform data on the z/OS system. The administrator must configure the printer definitions to use the transform filters because, by default, Print Interface does not transform data. The administrator and users can also specify transform options to control the transforms.
2. The z/OS UNIX transform commands provided with Infoprint Server Transforms let users transform data without printing it.

3. The Transform Manager manages the transform daemons and controls how many transform daemons are active at one time.

   Note: The Transform Manager does not manage the SAP to AFP transform and the Coax Printer Support feature, because they are not implemented as daemons.

4. Transforms provided with Infoprint Server Transforms perform the data transform.

NetSpool

The NetSpool component of Infoprint Server intercepts print data from VTAM applications, such as CICS and IMS, converts the data into line data, and creates output data sets on the JES2 or JES3 spool. You can configure NetSpool so that you do not need to change existing VTAM applications; that is, existing VTAM applications can send print requests to NetSpool in the same manner as they currently send print requests to SNA network printers.

Figure 7 shows the steps that occur from the time VTAM applications send print requests to NetSpool printer logical units (LUs) until NetSpool allocates output data sets on the JES spool. An explanation of each step follows.
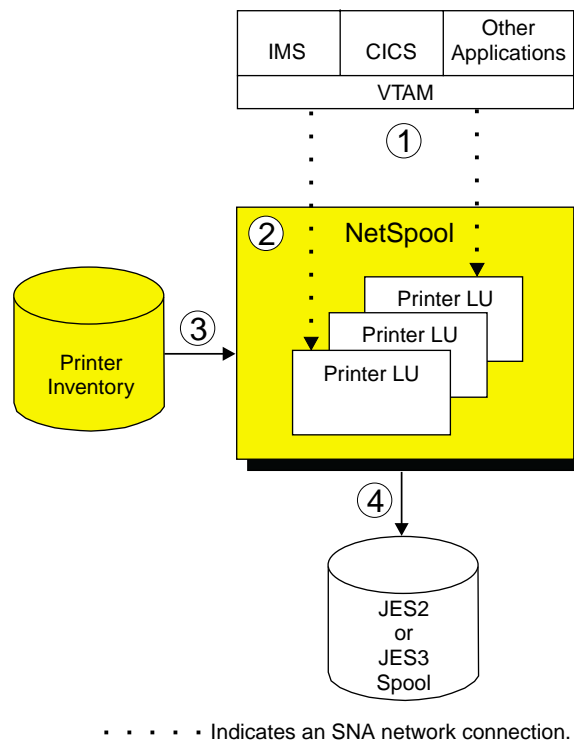
Figure 7. NetSpool System Diagram

1. VTAM applications, such as CICS or IMS, establish communication sessions with NetSpool printer logical units (LUs) instead of with SNA-network printers. Each NetSpool printer LU must be defined to VTAM as an application logical-unit (LU).

   NetSpool can process the following types of VTAM data streams:
   • SNA character string (SCS) data over an LU type 1 session
   • 3270 data over an LU type 3 or LU type 0 session

- A binary data stream over an LU type 0, type 1, or type 3 session

2. NetSpool runs as a VTAM application on the same or different z/OS system. Multiple instances of NetSpool can run simultaneously in separate address spaces; each instance of NetSpool can process VTAM print requests sent to different NetSpool printer LUs.

3. Each NetSpool printer LU must be defined in a printer definition or in a printer pool definition in the Printer Inventory. NetSpool uses information in the printer definition to format data into lines and pages, create either a line data stream or a PCL data stream, and group the data into output data sets.

4. NetSpool dynamically allocates output data sets on the JES2 or JES3 spool using JES allocation parameters specified in the printer definition, including:

   - JES work-selection parameters, such as class, forms name, and destination. These parameters cause JES to direct the output data sets to the correct JES output writer or functional subsystem application (FSA), such as PSF for OS/390 or IP PrintWay.

   - Advanced Function Presentation (AFP) parameters, such as the name of a form definition and page definition. PSF for OS/390 uses these parameters when printing data on IBM AFP printers.

   - Distribution information, such as name and address, which can be printed on output header pages

Additional functions provided by NetSpool are:

- **Operator control**

  The system operator can control NetSpool processing from the system console and from extended MCS consoles by issuing NetSpool commands while NetSpool is running. The operator can start and stop individual printer LUs and display the status of printer LUs. To assist in managing data sets from the console, the names of the output data sets created by NetSpool identify the VTAM application that generated the print request.

- **SCS and 3270 data stream support**

  NetSpool can convert SCS and 3270 data streams into line data streams or PCL data streams. Refer to the appendices in *z/OS Infoprint Server User's Guide* for information about how NetSpool supports SCS and 3270 data streams.

  NetSpool also supports the Transparent (TRN) control in SCS data. The TRN control identifies the start of a transparent data stream.

- **Broadcasting output**

  You can print output to several printers at the same time. Also, you can print output and send it to e-mail destinations at the same time. To do this, the administrator creates a printer pool definition in the Printer Inventory. When VTAM application data is printed to the printer pool definition, NetSpool creates multiple output data sets on the JES spool.

- **Installation exits**

  NetSpool supports exits written by an installation to customize NetSpool processing. NetSpool exits let you add data to the beginning of an output data set, map graphic escape characters to other printable characters, and modify or delete transparent data in an SCS data stream.

- **Binary data support**

  The administrator can request in the printer definition that NetSpool treat the data stream as binary data. NetSpool writes binary data to the output data set as variable length records without formatting the data and without rejecting

unsupported commands, orders, or data. This function is useful if you want to pass through all data without change and without including transparent (TRN) controls.

IP PrintWay

The IP PrintWay component of Infoprint Server transmits output data sets from the JES spool to remote printers or print servers and to e-mail destinations, using one of the following transmission protocols:

- LPR: The LPR protocol is a TCP/IP protocol defined by RFC 1179. An LPD that adheres to RFC 1179 must be running in the remote printer or system.
- Direct-sockets printing: The direct sockets printing protocol is a TCP/IP protocol in which data is transmitted directly to a designated port. The remote printer or print server must support direct sockets printing.
- Internet Printing Protocol (IPP): IPP is a standard TCP/IP protocol for printing over the Internet. An IPP server must be running in the remote printer or system.
- Virtual Telecommunications Access Method (VTAM): IP PrintWay supports printing to any printer that is defined to VTAM as LU type 0, LU type 1, or LU type 3. Supported output data streams are SNA character string (SCS) and Data Stream Compatible/Data Stream Extended (DSC/DSE). The Coax Printer Support feature of Infoprint Server Transforms is required to print to VTAM-controlled printers.
- E-mail: IP PrintWay can use the z/OS UNIX sendmail function to send your print output to one or more e-mail addresses. IP PrintWay sends the output, which can be in any data format, as an e-mail attachment.

Note: IP PrintWay cannot transmit data sets larger than two gigabytes to a remote LPD. Also, depending on the IP PrintWay options the administrator selects in the printer definition, IP PrintWay might not be able to transmit data sets larger than two gigabytes to a remote printer that uses the IPP or direct-sockets printing protocol, or to e-mail destinations.

Figure 8 on page 19 shows the steps that occur from the time IP PrintWay selects output data sets from the JES spool until IP PrintWay transmits the data sets to the target destination and then deletes the data sets from the JES spool. An explanation of each step follows.
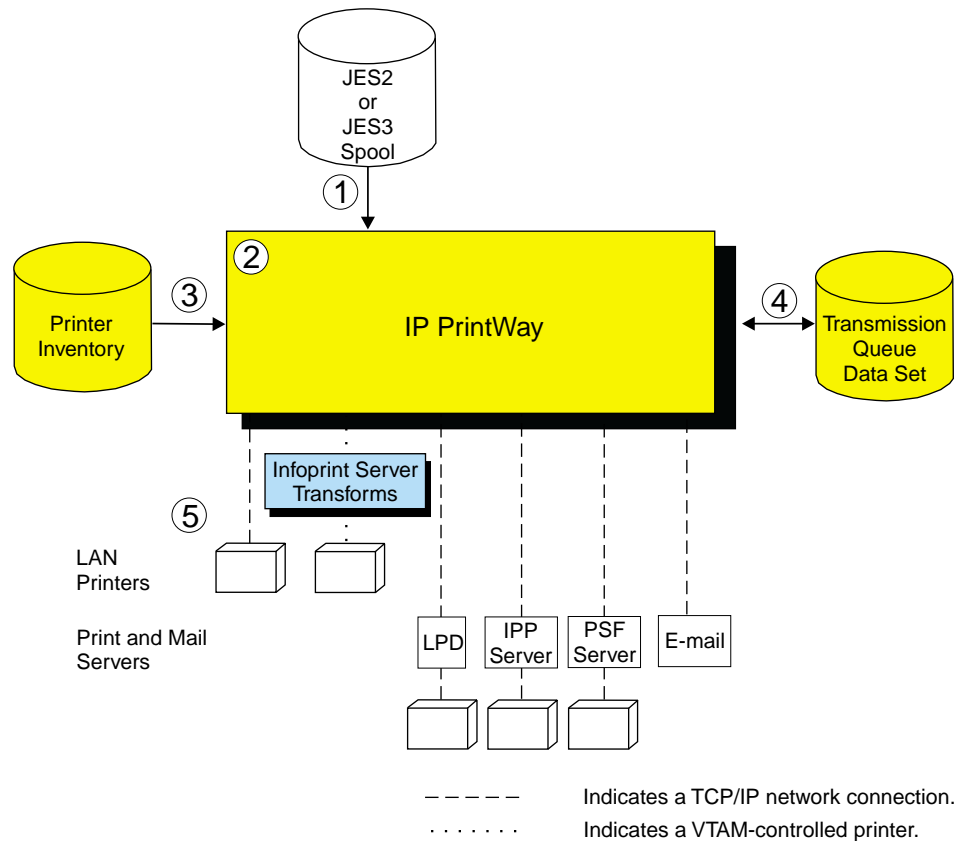
Figure 8. IP PrintWay System Diagram

1. IP PrintWay selects output data sets from the JES spool according to the JES work-selection parameters defined for the IP PrintWay FSA. For example, IP PrintWay might select all data sets in JES output class P.

   IP PrintWay can select data sets that were allocated on the JES spool by NetSpool or Print Interface, or submitted from TSO or batch applications. The data sets can contain line data, ASCII text data, or formatted data, such as PCL, PostScript, SAP, or MO:DCA-P (AFP) data.

2. IP PrintWay runs as a functional subsystem application (FSA) of JES2 or JES3. Several IP PrintWay FSAs can run in one functional subsystem address space (FSS) to handle a high volume of data; however, one PrintWay FSA can transmit data sets to multiple printers or print servers.

3. IP PrintWay uses information in the printer definition in the Printer Inventory to process data sets, select the transmission protocol (LPR, direct sockets, IPP, VTAM, or e-mail), and obtain the address of the target printer. IP PrintWay can also use the IP address of a target printer specified directly on an OUTPUT JCL statement or in an Infoprint Server job attribute.

   IP PrintWay recognizes data sets allocated on the JES spool by Print Interface and NetSpool and does not convert data from EBCDIC to ASCII or format the data if Print Interface or NetSpool has already converted data to ASCII. For other data sets, IP PrintWay can convert data between EBCDIC and ASCII, can add a header to each page, and can format data using the carriage-control characters in line data, an FCB, or pagination attributes specified in the printer definition.

   IP PrintWay can use transforms provided by Infoprint Server Transforms to convert data from one format to another. IP PrintWay calls Print Interface, if

necessary, to perform the data transform. See "Resubmitting Documents to Print Interface for Filtering" on page 191 for more information about how IP PrintWay calls Print Interface when the printer definition requests data transforms.

4. IP PrintWay maintains a transmission queue to keep track of data sets being processed. This transmission queue contains the status of each transmission, routing information, and so on. Using Infoprint Server ISPF panels, the system operator can monitor the status of transmissions, reroute data sets to another printer or e-mail destination, and change transmission options.

5. IP PrintWay transmits data sets to the target system using the protocol selected in the printer definition (LPR, direct sockets, IPP, VTAM, or e-mail). When IP PrintWay transmits data to a VTAM-controlled printer, IP PrintWay uses the Coax Printer Support feature of Infoprint Server Transforms.

   IP PrintWay can also transmit LPD options and IPP job attributes to the target LPDs and IPP servers. For example, IP PrintWay can transmit information that the LPD prints on a separator page.

   IP PrintWay can retry an unsuccessful transmission for a specified number of times at a specified interval. Retry limits and retry times can be specified in the printer definition and on an OUTPUT JCL statement. In addition to the requested retries, IP PrintWay retries an unsuccessful transmission automatically for a short period of time right after transmission.

Additional functions provided by IP PrintWay include:

- **Retaining jobs on the JES spool**

  After successfully transmitting each data set, or after completing the requested number of transmission attempts, IP PrintWay can retain the data set on the JES spool forever or for a period of time. Retention periods can be specified in the printer definition or on an OUTPUT JCL statement.

- **Printer selection using an OUTPUT JCL statement**

  On an OUTPUT JCL statement, a user can select the printer definition by specifying either (1) the name of the printer definition in the FSSDATA parameter or (2) the DEST, CLASS, or FORMS parameter (or a combination of these parameters) associated with the printer definition.

  Users can also specify the IP address for the target printer directly on the OUTPUT JCL statement, thereby eliminating the need for the administrator to create a printer definition for each printer in the Printer Inventory.

- **Accounting**

  For each data set processed, IP PrintWay writes a System Management Facility (SMF) type-6 record, which includes the number of bytes transmitted and the IP address of the target system.

- **Installation exits**

  IP PrintWay supports exits written by an installation to customize IP PrintWay processing. For example, an exit can change the IP address of the remote printer, add separator pages, modify SMF accounting records, and notify users of processing events.

- **Maintaining transmission order**

  IP PrintWay preserves the order of the data sets on the JES spool when transmitting data sets. IP PrintWay retains this order even if the transmission of the data sets must be retried. If a JES output group contains more than one output data set, IP PrintWay acquires all of the data sets in the output group before transmitting any of them and can transmit these data sets to the printer as a single file. Although the data sets are a single file, each data set starts printing on a new page.

- **Transmitting printer commands**

  The administrator can specify printer commands in the printer definition for IP PrintWay to send to the printer before or after the data to be printed. Printer commands can be used to change fonts or switch between simplex and duplex printing.

SNMP Subagent

The Infoprint Server SNMP subagent, in conjunction with support provided by PSF for OS/390 and the z/OS SNMP agent, lets administrators monitor printer characteristics (such as the printer resolution) and printer status (such as paper jams) for any printer controlled by PSF for OS/390. Also, administrators can be notified as soon as an intervention situation (such as a paper jam) occurs on the printer. This support does not let administrators change any printer characteristics.

To monitor PSF printers, the z/OS SNMP agent must be configured and an SNMP manager, such as IBM Network Printer Manager (NPM) for the Web, must be installed.

You can monitor PSF printers that do not contain internal SNMP agents, such as the IBM 3900 printer, and also PSF printers that have internal SNMP agents but are not TCP/IP-attached to PSF. You can also monitor PSF TCP/IP-attached printers that contain internal SNMP agents; however, consider defining PSF printers that have internal SNMP agents directly to the SNMP manager. When you define a printer directly to the SNMP manager, you can also monitor printer statistics and change some printer characteristics. Refer to the documentation for your printers to determine if they have internal SNMP agents.

Figure 9 on page 22 shows how the SNMP subagent fits into your system. An explanation of each step follows:
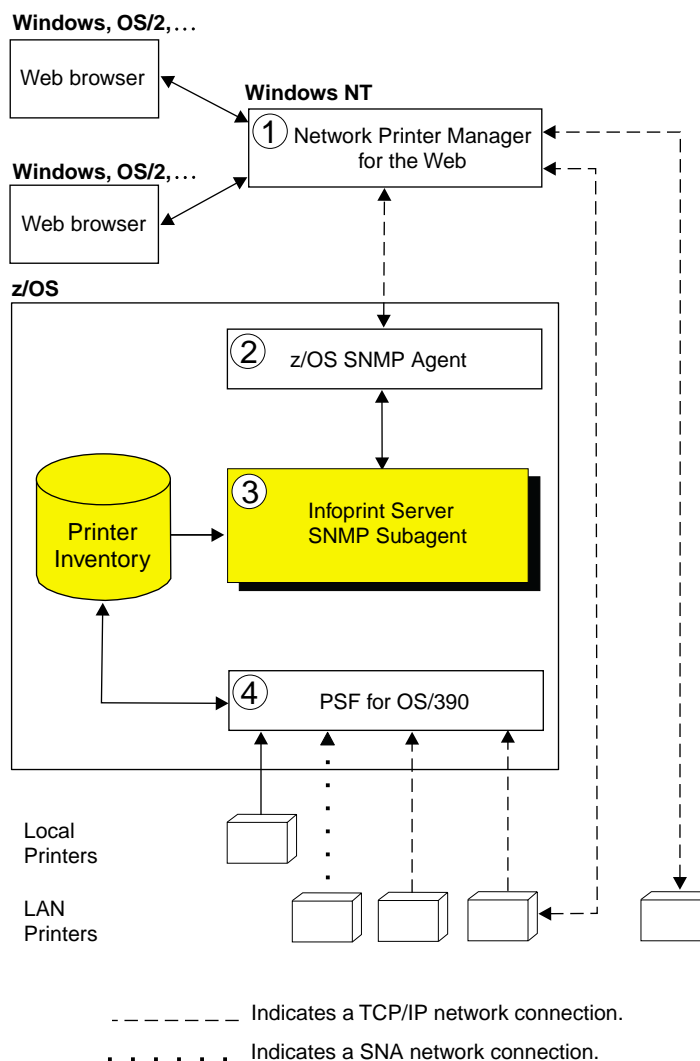
Figure 9. SNMP Subagent System Diagram

1. To monitor PSF printers, you must install an SNMP manager. You can install any SNMP manager that communicates with an SNMP agent that supports the general printer MIB (defined in RFC 1759) and has implemented support for multiple printers defined with one IP address.

   One SNMP manager that provides the required support is IBM Network Printer Manager (NPM) for the Web, which is shown in Figure 9. You can download NPM from the IBM Printing Systems Division Web site. Administrators can use a Java®-enabled version of Netscape Navigator or Microsoft® Internet Explorer to monitor PSF printers, while the NPM server runs on a Windows NT® system. Note that NPM limits the number of PSF printers an administrator can monitor at the same time; see the NPM online help for the maximum number of printers NPM lets you monitor.

   As shown in the figure, the SNMP manager (NPM) can also communicate directly with any TCP/IP-attached printer that contains an internal SNMP agent; this printer can be controlled by PSF, but this is not necessary.

2. The SNMP agent, part of the z/OS Communications Server, communicates with the SNMP manager and with the Infoprint Server SNMP subagent.

3. The Infoprint Server SNMP subagent communicates with PSF for OS/390 through the Printer Inventory. PSF for OS/390 stores printer characteristics and

printer status in the Printer Inventory for any printer that has SNMP-reporting enabled. (The administrator enables SNMP reporting in the FSA definition for the PSF printer).

The SNMP subagent transmits the information stored by PSF for OS/390 to the SNMP manager through the z/OS SNMP agent. The SNMP subagent also notifies the SNMP manager immediately when PSF for OS/390 detects a change to printer characteristics or printer status.

4. PSF for OS/390 obtains printer characteristics and printer status from any PSF-controlled printer. The PSF printer can be channel-attached, TCP/IP-attached, or SNA-attached; however, the PSF printer cannot be attached using the Download for OS/390 feature of PSF.

If a PSF-controlled printer is shared with another printing application, and is not connected to PSF when an intervention required situation occurs, PSF cannot report the change in printer status.

Part 2. Operation

Chapter 2. Operation Roadmap

This chapter can help you determine which operational tasks you need to perform to use the Infoprint Server components customized by your installation. Table 2 lists the components of Infoprint Server, the operational tasks, and the chapters in this publication that describe the required tasks.

Note: All components of Infoprint Server require that you start the Printer Inventory Manager.

Table 2. Summary of Infoprint Server Components and Operational Tasks

Component	Tasks	See Page:
Printer Inventory Manager	Start and stop the Printer Inventory Manager.	29
	View messages.	63
Print Interface	Start and stop the LPD, the IPP server, or the Print Interface subsystem.	29
		59
	Work with output data sets on the JES spool.	63
	View messages.	
Infoprint Server Transforms and Transform Manager	Start and stop the Transform Manager.	29
	View Infoprint Server Transforms messages.	63
NetSpool	Start and stop NetSpool.	37
	Work with output data sets on the JES spool.	59
	View NetSpool messages.	63
IP PrintWay	Start and stop IP PrintWay.	45
	Maintain the IP PrintWay transmission-queue.	49
	Work with output data sets on the JES spool.	59
	View IP PrintWay messages.	63
	View z/OS UNIX sendmail messages.	64
SNMP subagent	Start and stop the SNMP agent and subagent.	29
	View messages.	63

Chapter 3. Starting and Stopping Infoprint Server Daemons

This chapter describes how to start and stop the following Infoprint Server daemons:

- **aopd**, the Printer Inventory Manager daemon

  This is the main Infoprint Server daemon. It manages the Printer Inventory. It also supports printing from the local z/OS system and from remote clients that use the Server Message Block (SMB) protocol.

- **aopippd**, the IPP server daemon

  This daemon supports printing from remote clients that use the Internet Printing Protocol (IPP).

- **aoplpd**, the line printer daemon (LPD)

  This daemon supports printing from remote clients that use the TCP/IP line printer requester (LPR) protocol.

- **aopsnmpd**, the SNMP subagent daemon

  This daemon provides printer status information for PSF-controlled printers to the z/OS SNMP agent for viewing with an SNMP manager.

- **aopsubd**, the Print Interface subsystem daemon

  This daemon processes output data sets that specify the Print Interface subsystem on the SUBSYS parameter of the DD statement.

- **aopxfd**, the Transform Manager daemon

  This daemon manages other transform daemons, which transform data from one format to another. The Transform Manager daemon starts and stops transform daemons that are configured in the **aopxfd.conf** configuration file.

The following Infoprint Server daemon starts automatically when a print request is received from SAP R/3:

- **aopsapd**, the SAP Callback daemon

  This daemon handles callback notification for the SAP Output Management System (OMS).

This chapter describes how to perform the following tasks:

Task	See Page:
Starting Infoprint Server with the **aopstart** Command	29
Stopping Infoprint Server with the **aopstop** Command	32
Starting Infoprint Server with the AOPSTART JCL Procedure	34
Stopping Infoprint Server with the AOPSTOP JCL Procedure	35

Tip: Your administrator can use MVS automation tools or the **/etc/rc** shell script to start Infoprint Server daemons automatically during system initialization. Refer to *z/OS Infoprint Server Customization* for more information.

Starting Infoprint Server with the aopstart Command

Format

aopstart

Description

The **aopstart** command starts the Infoprint Server daemons that are specified in the Infoprint Server configuration file, **aopd.conf**. The Printer Inventory Manager daemon always starts whenever any other daemon starts. If the Infoprint Server configuration file does not exist, or if the **start-daemons** attribute in the configuration file is omitted, the Printer Inventory Manager daemon and the line printer daemon start.

If a daemon is already started when you issue **aopstart**, that daemon is not started again. When you restart after abnormal termination, the Print Interface component of Infoprint Server determines the status of data sets it had previously allocated on the JES spool and resumes normal processing.

Result: After you enter the **aopstart** command, you will receive one of these messages for each daemon:
- AOP075I Daemon *name* was started successfully.
- AOP077I Daemon *name* is already started.
- AOP076E Start of daemon *name* failed.

Usage Notes

1. Before you use the **aopstart** command, your installation might need to customize the **aopstart** EXEC. Refer to *z/OS Infoprint Server Customization* for information.

2. To use the **aopstart** command, you must either (1) be a member of the Security Server RACF® AOPOPER group or (2) have UID of 0. You can use the z/OS UNIX **su** command to switch to an effective UID of 0 if you have access to the BPX.SUPERUSER profile in the RACF FACILITY class.

3. Start the z/OS SNMP agent (**osnmpd**) *before* you start the Infoprint Server SNMP subagent daemon (**aopsnmpd**). Refer to *z/OS Communications Server: IP Configuration Reference* for information about how to start **osnmpd**.

4. Ensure that TCP/IP has finished initialization *before* you start the LPD (**aoplpd**), the IPP server daemon (**aopippd**), or the z/OS SNMP agent. You do not have to start TCP/IP to start any other daemons.

5. Start the Printer Inventory Manager daemon *before* you start IP PrintWay or NetSpool. Also, start the Printer Inventory Manager daemon before you start PSF for OS/390 if PSF for OS/390 uses the Printer Inventory.

6. Before you start Infoprint Server daemons, you might need to increase the maximum size of memory that is available. The following table shows the storage required by Infoprint Server daemons:

Daemon	MB Required
PostScript to AFP and PDF to AFP transform	42 MB to 64 MB
IPP Server	100 MB

To ensure that sufficient memory is available, either set the MAXASSIZE parameter in the BPXPRMxx member of SYS1.PARMLIB or enter the SETOMVS command from the console. For example, to set the maximum size to 42 MB, enter:

```
SETOMVS MAXASSIZE=44040192
```

Refer to *z/OS Infoprint Server Customization* for more information about setting the MAXASSIZE parameter in the BPXPRMxx member.

If you start Infoprint Server daemons from the OMVS shell under TSO, the SIZE parameter on your TSO/E logon determines the amount of memory available. When you start the Transform Manager daemon, set SIZE=42000, or larger. When you start the IPP Server daemon, set SIZE=100000.

7. The **aopstart** command does not restart a daemon that is running. To restart a daemon, first use the **aopstop** command to stop the daemon, and then issue the **aopstart** command.

8. From ISPF, you can use the TSO **oshell** or **omvs** command to run the **aopstart** command. On the ISPF Command Shell panel (ISPF option 6), type one of the following commands:

   - `oshell aopstart`

   - `omvs`

     Then, on the OMVS command line, type `aopstart`

9. You can use the TSO **ishell** command to enter the **aopstart** command. You must, however, type the full path name of the **aopstart** command because the z/OS ISPF shell does not use environment variables set in the **/etc/profile** profile. For example, if the **aopstart** command is in the default directory, run this command:

   `/usr/lpp/Printsrv/bin/aopstart`

Environment Variables

Infoprint Server daemons use the following variables set in the environment:

AOPTRACEON
> Turns tracing on.

LANG   Infoprint Server uses this variable to set the default directory for Infoprint Server messages in the NLSPATH variable.

Infoprint Server daemons use the following variables set in the **aopstart** REXX EXEC.

_BPXK_SETIBMOPT_TRANSPORT
> The TCP/IP job name associated with the TCP/IP stack you want to use.

AOP_SAP2AFP_RESOURCES
> Path where resources used by the SAP to AFP transform are located.

AOPCONF   Names the Infoprint Server configuration file. The file named in this variable takes precedence over configuration file **/etc/Printsrv/aopd.conf**.

AOPSAPD_CONF
> Names the SAP Callback daemon configuration file. The file named in this variable takes precedence over configuration file **/etc/Printsrv/aopsapd.conf**.

AOPTRACEDIR
> Names the directory where trace files are to be written. The directory named in this variable takes precedence over directory **/var/Printsrv/trace**.

AOPXFD_CONF
> Names the Infoprint Server configuration file used by the Transform Manager. The file named in this variable takes precedence over configuration file **/etc/Printsrv/aopxfd.conf**.

CLASSPATH	Lists the directories where files used by the Infoprint Server IPP Server are located.
JAVA_HOME	Lists the directory where Java files used by the Infoprint Server IPP Server are located.
LIBPATH	The path used to locate Infoprint Server and SAP remote function calls dynamic link library (DLL) files.
NLSPATH	Lists the directory where the Infoprint Server message catalogs are located.
PATH	Lists the directory where Infoprint Server daemons are located.
STEPLIB	Names the LE and C^{++} run-time libraries. Specify this variable only if you cannot add the *hlq*.SCEERUN and *hlq*.SCLBDLL data sets to the system LNKLST.

Files

/etc/Printsrv/aopd.conf

The default Infoprint Server configuration file. This file is optional. The file named in the AOPCONF environment variable takes precedence over this file.

/etc/Printsrv/aopsapd.conf

The default SAP Callback daemon configuration file. This file is required if the SAP Callback daemon receives a print request from SAP R/3. The file named in the AOPSAPD_CONF environment variable takes precedence over this file.

/etc/Printsrv/aopxfd.conf

The default Transform Manager configuration file. This file is required if you start the Transform Manager daemon. The file named in the AOPXFD_CONF environment variable takes precedence over this file.

Exit Values

| **0** | Successful completion |
| **>0** | An error prevented one or more daemons from being started. |

Related Information

Refer to *z/OS Infoprint Server Customization* for more information about the RACF AOPOPER group, environment variables, configuration files, and the **aopstart** EXEC.

Stopping Infoprint Server with the aopstop Command

Format

aopstop [-d *daemon***]... [now]**

Description

The **aopstop** command stops all Infoprint Server daemons or only the specified daemons. Unless you specify the **now** option, the daemons stop after current activity completes.

Result: After you issue the **aopstop** command, you will receive one of these messages for each daemon:
- AOP079I A shutdown of daemon *name* has been initiated.
- AOP078E Daemon *name* is not running.

Options

-d *daemon*   Specifies the daemon to stop. If you omit this option, all active daemons are stopped, including the Inventory Manager daemon. You can specify one of these values:

ippd	Stops the Internet Printing Protocol daemon, **aopippd**.
lpd	Stops the line printer daemon, **aoplpd**.
snmpd	Stops the SNMP subagent daemon, **aopsnmpd**.
subd	Stops the Print Interface subsystem daemon, **aopsubd**.
xfd	Stops the Transform Manager daemon, **aopxfd**.

now   Stops the daemons immediately. If work is in progress, incorrect output or data loss may result. If this option is not specified, the daemons stop after current activity completes.

Usage Notes

1. To use the **aopstop** command, you must either (1) be a member of the Security Server RACF AOPOPER group or (2) have a UID of 0. You can use the z/OS UNIX **su** command to switch to an effective UID of 0 if you have access to the BPX.SUPERUSER profile in the RACF FACILITY class.
2. Before you stop the Printer Inventory Manager daemon, stop other programs that are using the Printer Inventory, such as NetSpool, IP PrintWay, and PSF for OS/390.
3. To stop the Printer Inventory Manager daemon, as well as all other Infoprint Server daemons, enter the **aopstop** command without specifying any daemon names.

Examples

To stop all active daemons (including the Printer Inventory Manager daemon) after current activity ends, use the following command. The Print Interface component of Infoprint Server stops accepting new print requests and completes all work in progress before shutting down.

```
aopstop
```

To stop the Transform Manager and line printer daemons, use the following command:

```
aopstop -d xfd -d lpd
```

To stop all daemons immediately, use the following command. Documents that are being processed may be lost.

```
aopstop now
```

Environment Variables

AOPCONF
Names the Infoprint Server configuration file. The file named in this variable takes precedence over configuration file **/etc/Printsrv/aopd.conf**.

LANG Infoprint Server uses this variable to set the default directory for Infoprint Server messages in the NLSPATH variable.

NLSPATH
Lists the directory where the Infoprint Server message catalogs are located.

File

/etc/Printsrv/aopd.conf
The default Infoprint Server configuration file. This file is optional. The file named in the AOPCONF environment variable takes precedence over this file.

Exit Values

0   Stopping of the daemons was successfully initiated.

>0   An error occurred that prevented stopping the daemons.

Related Information

Refer to *z/OS Infoprint Server Customization* for more information about the AOPOPER group, environment variables, and configuration files.

Starting Infoprint Server with the AOPSTART JCL Procedure

The AOPSTART procedure starts the Infoprint Server daemons that are specified in the Infoprint Server configuration file, **aopd.conf**. The Printer Inventory Manager daemon always starts whenever any other daemon starts. If the Infoprint Server configuration file does not exist, or if the **start-daemons** attribute in the configuration file is omitted, the Printer Inventory Manager daemon and the line printer daemon start. If a daemon is already started when you run the AOPSTART procedure, that daemon is not started again.

When you restart Infoprint Server daemons after abnormal termination, the Print Interface component of Infoprint Server determines the status of data sets it had previously allocated on the JES spool and resumes normal processing.

To start Infoprint Server daemons with the AOPSTART JCL procedure, enter the following MVS START command:

```
START AOPSTART
```

After you run the AOPSTART procedure, you will receive one of these messages for each daemon:
- AOP075I Daemon *name* was started successfully.
- AOP077I Daemon *name* is already started.
- AOP076E Start of daemon *name* failed.

Guidelines:

1. Before you run the AOPSTART procedure, your installation might need to customize the **aopstart** EXEC and the AOPSTART procedure. Refer to *z/OS Infoprint Server Customization* for information.

2. Start the z/OS SNMP agent (**osnmpd**) *before* you start the Infoprint Server SNMP subagent daemon (**aopsnmpd**). Refer to *z/OS Communications Server: IP Configuration Reference* for information about how to start **osnmpd**.

3. Ensure that TCP/IP has finished initialization *before* you start the LPD (**aoplpd**), the IPP server daemon (**aopippd**), or the z/OS SNMP agent. You do not have to start TCP/IP to start other Infoprint Server daemons.

4. Start the Printer Inventory Manager daemon *before* you start IP PrintWay or NetSpool. Also, start the Printer Inventory Manager daemon before you start PSF for OS/390 if PSF for OS/390 uses the Printer Inventory.

5. The AOPSTART procedure does not restart a daemon that is running. To restart a daemon, first run the AOPSTOP procedure to stop the daemon, and then run the AOPSTART procedure.

Stopping Infoprint Server with the AOPSTOP JCL Procedure

The AOPSTOP procedure stops all Infoprint Server daemons or only the specified daemons.

After you run the AOPSTOP procedure, you will receive one of the following messages for each daemon:
- AOP079I A shutdown of daemon *name* has been initiated.
- AOP078E Daemon *name* is not running.

To stop Infoprint Server daemons with the AOPSTOP JCL procedure, enter the following MVS START command:

```
START AOPSTOP [OPTIONS='-d daemon... [now]']
```

where:

-d *daemon*   Specifies the daemon to stop. If you omit this option, all active daemons are stopped, including the Inventory Manager daemon. You can specify one of these values:

ippd	Stops the Internet Printing Protocol daemon, **aopippd**.
lpd	Stops the line printer daemon, **aoplpd**.
snmpd	Stops the SNMP subagent daemon, **aopsnmpd**.
subd	Stops the Print Interface subsystem daemon, **aopsubd**.
xfd	Stops the Transform Manager daemon, **aopxfd**.

now   Stops the daemons immediately. If work is in progress, incorrect output or data loss may result. If this option is not specified, the daemons stop after current activity completes.

Examples:

1. To stop all active daemons (including the Printer Inventory Manager daemon) after current activity ends, enter the following MVS START command. The Print Interface component of Infoprint Server stops accepting new print requests and completes all work in progress before shutting down.

   ```
   START AOPSTOP
   ```

2. To stop the Transform Manager and line printer daemons, enter the following MVS START command:

```
START AOPSTOP OPTIONS='-d xfd -d lpd'
```

3. To stop all daemons immediately, enter the following MVS START command.
   Documents that are being processed may be lost.

```
START AOPSTOP OPTIONS='now'
```

Guidelines:

1. Before you run the AOPSTOP procedure, your installation might need to
   customize it. Refer to *z/OS Infoprint Server Customization* for information.

2. Before you stop the Printer Inventory Manager daemon, stop other programs
   that are using the Printer Inventory, such as NetSpool, IP PrintWay, and PSF for
   OS/390.

3. To stop the Printer Inventory Manager daemon, as well as all other Infoprint
   Server daemons, run the AOPSTOP procedure without specifying any daemon
   names.

Chapter 4. Starting and Stopping NetSpool

This chapter describes how to start and stop NetSpool and how to control NetSpool printer logical units (LUs) from the system console, including:
- Starting the NetSpool program
- Issuing NetSpool commands
- Stopping the NetSpool program
- Starting a NetSpool printer LU
- Stopping a NetSpool printer LU
- Displaying the status of NetSpool printer LUs

Starting the NetSpool Program

Each instance of NetSpool runs in its own system address space and processes data sets for different classes of NetSpool printer LUs. Before you start the NetSpool program, ensure that your installation has performed these customization tasks described in *z/OS Infoprint Server Customization*:

- Customize the Printer Inventory Manager.

- Customize NetSpool and create a startup procedure. The LU classes NetSpool processes are specified on the EXEC statement.

Before you start NetSpool, the administrator might want to perform the following administrative tasks:

- Define NetSpool printer LUs in the Printer Inventory, as described in Chapter 12, "Planning Printer and Printer Pool Definitions for NetSpool" on page 121.

- Define NetSpool printer LUs to VTAM, as described in Chapter 15, "Defining NetSpool Printer LUs to VTAM" on page 213.

These administrative tasks can be performed before or after starting the NetSpool program. When NetSpool starts, it attempts to start any printer LUs already defined in the Printer Inventory and assigned to one of the started LU classes. If a new printer LU name is defined in the Printer Inventory while NetSpool is running, NetSpool automatically attempts to start that printer LU if it is in one of the started LU classes.

After performing the required customization tasks and optional administrative tasks, follow these steps to start NetSpool:

1. Make sure that the Printer Inventory Manager daemon is started; see Chapter 3, "Starting and Stopping Infoprint Server Daemons" on page 29.

2. Make sure that VTAM is started, and then activate any printer LUs defined in the Printer Inventory in the LU classes NetSpool will process. Use the VTAM VARY ACT command to activate the printer LUs.

3. Run the NetSpool startup procedure. Use the following MVS START command:

   START *procedure_name***[,JOBNAME=***jobname***]**

   For example, if the NetSpool startup procedure is a member named APIJPJCL in the SYS1.PROCLIB library, issue the following command:

   START APIJPJCL

   You can optionally specify a jobname for each instance of NetSpool that you start. A jobname lets you easily distinguish between different instances of NetSpool. To specify a jobname of NETSPOOL, enter the following command:

   START APIJPJCL,JOBNAME=NETSPOOL

If NetSpool cannot start a printer LU because the printer LU is inactive in VTAM or because it is started by another instance of NetSpool, NetSpool starts the printer LU automatically when the printer LU becomes available.

After NetSpool initialization, you can issue the NetSpool DISPLAY SELECTED command, described on page 43, to display the status of the printer LUs that NetSpool started or attempted to start.

Issuing NetSpool Commands

To control NetSpool printer LUs, you use the MVS MODIFY command to direct NetSpool commands to NetSpool. You can also use the MVS STOP command to stop the NetSpool program.

The MVS MODIFY and STOP commands use the jobname and identifier fields to direct the command to the appropriate instance of NetSpool. If only one instance of a NetSpool startup procedure is running on a system, or if you specified a different jobname for each instance in the JOBNAME parameter of the START command, then specify only the jobname field in the command. However, if you started multiple instances of NetSpool with the same jobname, then use the identifier field to distinguish between them. For more infomation about how to specify the jobname and identifier for your installation, refer to *z/OS MVS System Commands*.

The format of the MODIFY command is:

```
  ┌─ Syntax ──────────────────────────────────────────────────────┐
  │ {F │ MODIFY} jobname[.id],NetSpool_command                      │
  └────────────────────────────────────────────────────────────────┘
```

where:

F | MODIFY
> The MODIFY command name. You can enter either **F** or **MODIFY**.

jobname
> The job name of the NetSpool startup procedure. This can be the member name (for example, APIJPJCL) or the name you specified on the JOBNAME parameter of the START command.

id A number that identifies the NetSpool startup procedure to which you want the NetSpool command directed. If only one instance of a NetSpool startup procedure is running on a system, or you specified different job names in the JOBNAME parameter on the START command, then you do not need to specify this field. However, if you started more than one instance of NetSpool using the same NetSpool startup procedure, and you did not specify the JOBNAME parameter on the START command, then you must specify the identifier to distinguish among them.

NetSpool_command
> The NetSpool command, for example, `LUNAME=LUPRT001,ADD`. The following sections describe NetSpool commands.

Stopping the NetSpool Program

You can enter one of several NetSpool operator commands to stop execution of the NetSpool program. Which command you choose depends on how quickly you want to stop NetSpool. You can stop NetSpool:

- After all VTAM sessions end normally.
- Immediately, after NetSpool ends all VTAM sessions.
- Immediately, *without* ending VTAM sessions. Use this method only when other methods fail.

The VTAM HALT command also can cause sessions with NetSpool printer LUs to end or can stop the NetSpool program.

Stopping NetSpool After Current Sessions End Normally

Use the QUIT command to stop the NetSpool program after all current sessions end normally. The QUIT command prevents new sessions from starting. Each current session ends only when the VTAM application that established the session ends it. Thus, a long delay might occur before NetSpool stops and returns to the operating system.

The format of the QUIT command is:

```
┌─ Syntax ──────────────────────────────────────────────────────┐
│ F jobname[.id],QUIT                                            │
└───────────────────────────────────────────────────────────────┘
```

Stopping NetSpool Immediately

Use the QUIT FORCE command to stop the NetSpool program after ending all current sessions immediately. Because NetSpool ends all current sessions immediately, some output data sets might be incomplete. NetSpool creates data sets with all data received.

The format of the QUIT FORCE command is:

```
┌─ Syntax ──────────────────────────────────────────────────────┐
│ F jobname[.id],QUIT FORCE                                      │
└───────────────────────────────────────────────────────────────┘
```

Stopping NetSpool Abnormally

Use the KILL or MVS STOP command to stop the NetSpool program immediately, without ending any VTAM sessions or creating output data sets. Data already sent to NetSpool is lost.

Attention: Use the KILL and STOP commands only when a hang condition prevents completion of a QUIT FORCE command.

The format of the KILL command is:

```
┌─ Syntax ─────────────────────────────────────────────────────┐
│  F jobname[.id],KILL                                          │
└───────────────────────────────────────────────────────────────┘
```

The MVS STOP command provides the same function as the KILL command. The
format of the STOP command is:

```
┌─ Syntax ─────────────────────────────────────────────────────┐
│  STOP jobname[.id]                                            │
└───────────────────────────────────────────────────────────────┘
```

Using VTAM HALT Commands

When you enter a VTAM HALT command, NetSpool takes one of the following
actions, depending on the type of HALT command entered:

- Standard HALT

  The HALT command causes all VTAM sessions to end normally; new sessions
  are not allowed to start. No data is lost; NetSpool creates output data sets with
  all received data. NetSpool places all started printer LUs in the WAITING state,
  periodically (every 60 seconds) attempting to restart the printers.

- HALT QUICK

  The HALT QUICK command causes all VTAM sessions to end immediately; new
  sessions are not allowed to start. No data is lost; NetSpool creates output data
  sets with all received data. NetSpool places all started printer LUs in the
  WAITING state, periodically (every 60 seconds) attempting to restart the printers.

- HALT CANCEL

  The HALT CANCEL command causes all VTAM sessions to end immediately;
  new sessions are not allowed to start. No data is lost; NetSpool creates output
  data sets with all received data. The NetSpool program stops, returning to the
  operating system.

Starting NetSpool Printer LUs

When you start NetSpool, the printer LUs that are assigned to the LU classes
specified on the EXEC statement in the NetSpool startup procedure are started.
After NetSpool is started, you can use the LUNAME ADD command to start a
printer LU that is assigned to a different LU class or to restart a printer LU that you
had previously stopped.

Note: After NetSpool has started, if you want to start all printers in another LU
class, consider starting another instance of NetSpool and specifying the LU
class on the EXEC statement. This eliminates the need to issue the
LUNAME ADD command numerous times to start many printer LUs.

The printer LU to be started must be defined in a printer definition in the Printer
Inventory and also must be defined to VTAM with an APPL statement. For more
information about APPL statements, see "Creating APPL Statements" on page 214.

If you specify a printer LU name in a printer definition after NetSpool is started,
NetSpool automatically tries to start the printer LU if it is assigned to one of the LU
classes that NetSpool has started. This means that you do not need to use the

LUNAME ADD command to start the printer LU in this case; however, you must still activate it in VTAM using the VARY ACT command.

To start a printer LU, do the following:

1. If the printer LU is not active in VTAM, activate it using the VTAM VARY ACT command.
2. Add the printer LU to NetSpool, using the LUNAME ADD command shown below.

The format of the LUNAME ADD command is:

Syntax

`F `*`jobname`*`[.`*`id`*`]`**`,LUNAME=`***`lu-name`***`,ADD`**

---

where:

lu-name   Specifies the name of the printer LU. The name must match the LU name in a printer definition in the Printer Inventory.

If NetSpool cannot start a printer LU because it is not active in VTAM or because it is started by another instance of NetSpool, NetSpool starts the printer LU automatically at a later time, when the printer LU becomes available. If you display printer LUs using the DISPLAY command, the printer LU will be in the WAITING state.

Example: In this example, printer LU LUPRT003 is varied active in VTAM and then is added to NetSpool.

```
VARY NET,ACT,ID=LUPRT003
F jobname.id,LUNAME=LUPRT003,ADD
```

Stopping NetSpool Printer LUs

While NetSpool is running, you can end the VTAM session with a printer LU and then use the LUNAME DEL command to stop the printer LU. Or, you can stop the VTAM session and the printer LU with the LUNAME PURGE command.

In most cases, you should use the LUNAME DEL command, which lets you stop a printer LU after the VTAM session has ended normally. The LUNAME PURGE command is a more drastic method of stopping a printer LU, because the VTAM session ends immediately and no more data is sent to the printer LU; however, the printer LU does finish processing data it has already received.

If you remove a printer LU name from a printer definition after NetSpool is started, NetSpool automatically stops the printer LU after the VTAM application ends the session; therefore, you do not need to use the LUNAME DEL command to stop the printer LU in this case.

Stopping a Printer LU with the LUNAME DEL Command

To stop a printer LU with the LUNAME DEL command, do the following:

1. If the printer is started, deactivate the printer LU in VTAM, using the VTAM VARY INACT command. The type of VARY command you choose depends on how quickly you want the VTAM session to end. In either case, NetSpool creates an output data set with all data received; therefore, no data is lost.

- Specify the TYPE=IMMED option to end the VTAM session immediately.
- Specify no TYPE option to wait until the VTAM application sending the data ends the session normally. A long delay might occur until the session ends.

When you deactivate the printer LU in VTAM, the printer is placed in the WAITING state, meaning that NetSpool automatically restarts the printer LU when you reactivate the printer LU in VTAM.

Note: If a printer LU is already in the WAITING state because NetSpool could not start it, you do not need to first deactivate the printer in VTAM.

2. DELETE the printer LU from NetSpool, using the LUNAME DEL command shown below. This command frees resources for the printer LU and prevents NetSpool from restarting it when you reactivate the printer LU using VTAM. After you enter the LUNAME DEL command, the printer LU will be in a PENDING CLOSE state until NetSpool has created an output data set with data received prior to the LUNAME DEL command.

Note: Wait for the printer to become inactive in VTAM before you enter this command.

The format of the LUNAME DEL command is:

Syntax

`F jobname[.id],LUNAME=lu-name,DEL`

---

where:

lu-name Specifies the name of the printer LU. The name must match the LU name in a printer definition in the Printer Inventory.

Examples:
- In this example, printer LU LUPRT003 is deactivated in VTAM after the VTAM session for printer LU LUPRT003 ends immediately. The LUNAME DEL command, entered after the printer is inactive in VTAM, causes NetSpool to delete LUPRT003 from its list of selected printers LUs.

      VARY NET,INACT,ID=LUPRT003,TYPE=IMMED

      F jobname.id,LUNAME=LUPRT003,DEL

- In this example, NetSpool deletes printer LU LUPRT003 from its list of selected printers. Use the LUNAME DEL command without preceding it with a VARY INACT command only when the printer LU has not been successfully started; that is, the printer LU is in the WAITING state.

      F jobname.id,LUNAME=LUPRT003,DEL

Stopping a Printer LU with the LUNAME PURGE Command

The LUNAME PURGE command deactivates the printer LU in VTAM immediately and closes the printer LU, deleting it from NetSpool's list of selected printers.

NetSpool creates an output data set with any data received from VTAM prior to issuance of the LUNAME PURGE command. However, the VTAM session is ended as soon as the command is issued, and the printer LU does not receive any new data from VTAM.

Note: The LUNAME PURGE command is most useful when, because of a significant error with the printer LU, you want processing to stop immediately for that printer LU and you do not want to allow any more data to be sent to it.

The format of the LUNAME PURGE command is:

Syntax

`F` *jobname*`[.`*id*`],`**LUNAME=**`*lu-name*`,`**PURGE**
---

where:

lu-name   Specifies the name of the printer LU. The name must match the LU name in a printer definition in the Printer Inventory.

Example: In this example, the VTAM session with printer LU LUPRT003 ends immediately. LUPRT003 is in a PENDING CLOSE state while NetSpool creates an output data set for any data it has received. NetSpool deletes LUPRT003 from its list of selected printers.

`F` *jobname.id*`,LUNAME=LUPRT003,PURGE`

To reactivate a printer LU after purging or deleting it, activate the printer LU in VTAM using the VTAM VARY ACT command. Then use NetSpool's LUNAME ADD command to start the printer LU again.

Displaying the Status of NetSpool Printer LUs

Use the DISPLAY command to display the status of printer LUs. Printer LUs can be in one of three states:

- STARTED

  NetSpool has selected this printer LU for processing. The printer LU is either in a session with a VTAM application or is ready to accept a request from a VTAM application to establish a session.

- WAITING

  NetSpool has selected the printer LU for processing, but has been unable to start the printer LU because it is not available. NetSpool periodically (every 60 seconds) attempts to start the printer, automatically starting it when it becomes available. You do not receive a message on the console when NetSpool automatically starts a printer LU at a later time.

  Because NetSpool periodically attempts to start printer LUs in the WAITING state, you might want to either start or stop a printer LU that is in the WAITING state.

  – To start a printer LU that is not active in VTAM, activate the printer LU with the VTAM VARY ACT command. When the printer becomes active, NetSpool automatically starts the printer LU.

  – To stop a printer LU, enter the LUNAME DEL command. Because NetSpool has not successfully started the printer LU, you do not need to first vary the printer inactive in VTAM.

  – To start a printer LU that is started by another instance of NetSpool, first stop the printer in the other instance of NetSpool, using the VTAM VARY INACT command and the LUNAME DEL command. Then, activate the printer LU in VTAM; this instance of NetSpool automatically starts it.

- PENDING CLOSE

  NetSpool selected this printer LU for stopping because you entered the LUNAME DEL or LUNAME PURGE command. NetSpool will stop the printer LU after NetSpool creates an output data set with all data received before the LUNAME DEL or LUNAME PURGE command was entered.

  After the printer LU stops, it no longer is displayed when you issue the DISPLAY command for this instance of NetSpool. At that point, you can restart the printer LU by activating the printer LU with the VTAM VARY ACT command and then adding the printer LU to NetSpool using the LUNAME ADD command.

Note: The status displayed is the status for this instance of NetSpool only. For example, a printer LU might not display as STARTED, WAITING, or PENDING CLOSE, but it might be started in another instance of NetSpool.

The format of the DISPLAY command is:

```
┌─ Syntax ─────────────────────────────────────────────────────────────────┐
│ F jobname.id,DISPLAY {LUNAME=luname | SELECTED | STARTED | WAITING | TRACE} │
└───────────────────────────────────────────────────────────────────────────┘
```

where:

LUNAME=_luname_

Requests that NetSpool display the status for the printer LU. This command returns one of the following:

- _luname_ WAS NOT FOUND
- _luname_ IS STARTED
- _luname_ IS WAITING
- _luname_ IS PENDING CLOSE

SELECTED   Requests that NetSpool display the printer LUs that are selected for processing. The status of the printers is STARTED, WAITING, or PENDING CLOSE. The minimum abbreviation allowed is SEL.

STARTED   Requests that NetSpool display all printer LUs in the STARTED state. The minimum abbreviation allowed is STA.

WAITING   Requests that NetSpool display all printer LUs in the WAITING state. The minimum abbreviation allowed is WAI.

TRACE   Requests that NetSpool display all printer LUs that are being traced and whether internal tracing is active. For more information about tracing printer LUs, refer to _z/OS Infoprint Server Messages and Diagnosis_. The minimum abbreviation allowed is TRA.

Example: In this example, NetSpool lists the status of all printer LUs selected for processing.

```
F jobname.id,DISPLAY SELECTED
```

This is sample output from the DISPLAY command:

```
API1007I Display of SELECTED printer LUs
API1002I LUPRT002 — LU STARTED
API1001I LUPRT000 — LU PENDING CLOSE
API1002I LUPRT001 — LU STARTED
API1003I LUPRT003 — LU WAITING
```

Chapter 5. Starting and Stopping IP PrintWay

This chapter describes how to start and stop IP PrintWay, including:
- Starting an IP PrintWay functional subsystem
- Stopping an IP PrintWay functional subsystem
- Starting z/OS UNIX sendmail
- Using SDSF commands

For more information about the JES2 and JES3 commands that are described in this chapter, refer to one of the following publications:
- *z/OS JES2 Commands*
- *z/OS JES3 Commands*

For more information about the MVS commands described in this chapter, refer to *z/OS MVS System Commands*.

Starting an IP PrintWay Functional Subsystem

IP PrintWay operates as a JES functional subsystem (FSS), an extension of JES that runs in its own system address space. Before you start an IP PrintWay functional subsystem (FSS) and the functional subsystem applications (FSAs) under its control, your installation must:
- Customize the Printer Inventory Manager.
- Define an IP PrintWay FSS and one or more FSAs under control of the FSS to JES.
- Customize IP PrintWay and create a cataloged start procedure for each FSS.
- Create an FSS definition for some or all IP PrintWay FSSs in the Printer Inventory.
- Create an FSA definition for some or all IP PrintWay FSAs in the Printer Inventory.

These tasks are described in *z/OS Infoprint Server Customization*.

IP PrintWay uses the configuration information specified in the FSS and FSA definitions when the FSS and each FSA starts. FSS and FSA definitions are optional; if an FSS or FSA definition does not exist in the Printer Inventory, IP PrintWay uses default configuration information.

After these tasks are accomplished, you can enter commands at the operator console to start each IP PrintWay FSA. You do not need to enter a command to start the FSS because JES starts the FSS automatically when you start the first FSA under control of that FSS.

Notes:

1. If you change either the IP PrintWay startup JCL procedure or the IP PrintWay FSS definition after IP PrintWay is already started, you must stop and restart the IP PrintWay FSS to pick up the changes.

2. If you change the IP PrintWay FSA definition after IP PrintWay is already started, you must stop and restart the IP PrintWay FSA.

3. You do not need to stop and restart IP PrintWay FSAs if you restart TCP/IP. IP PrintWay automtically restablishes connection with TCP/IP.

If an FSA is defined with the START=YES parameter on the JES2 PRT*nnnnn* statement, JES2 automatically starts the FSA when you bring up the z/OS system. JES3 does not support the automatic start option.

Follow these steps to start an IP PrintWay FSA:

1. Make sure that TCP/IP is started on the z/OS system.

2. Make sure that the Printer Inventory Manager daemon is started; see Chapter 3, "Starting and Stopping Infoprint Server Daemons" on page 29.

3. Verify that the target printers and print servers are online or started. You can start the target printers and print servers *after* you start the IP PrintWay FSA; however, they should be started before the FSA attempts to transmit data to that printer or server; otherwise, a TCP/IP error occurs.

4. Start the IP PrintWay FSA and the FSS by entering the following JES2 or JES3 start command:

   JES2: $S*fsa_name*[,*fsa_name* ...]

   JES3: *CALL WTR,OUT=*fsa_name*

   Replace *fsa_name* with one of the following:
   • In JES2, the name of the JES PRT*nnnn* statement, for example, PRT0001
   • In JES3, the name in the JNAME parameter of the JES DEVICE statement

Note: If your installation has created an FSA definition for the IP PrintWay FSA, ensure that the name in the FSA definition matches the name you specify to JES when you start the FSA; if the names do not match, IP PrintWay does not use the information in the FSA definition when the FSA starts.

Stopping an IP PrintWay Functional Subsystem

To stop an IP PrintWay Functional Subsystem (FSS), you should first stop all FSAs under its control.

Stopping an FSA

Use the following JES2 command or JES3 commands to stop an IP PrintWay FSA. The FSA stops *after* transmitting the current data set and data sets already selected for transmission.

JES2: $P*fsa_name*[,*fsa_name* ...]

JES3: *VARY,*fsa_name*[,*fsa_name* ...],OFFLINE*
        *CANCEL,*fsa_name*

Replace *fsa_name* with one of the following:
• In JES2, the name of the JES PRT*nnnnn* statement, for example, PRT123
• In JES3, the name in the JNAME parameter of the JES DEVICE statement

The *VARY command makes the FSA unavailable for transmitting data sets but allows the current data set to finish. The *CANCEL command stops the FSA.

Note: IP PrintWay does *not* support the JES2 Cancel command ($C).

Processing of Data Sets Retained on JES Spool or Waiting to be Retried

When you stop an FSA, IP PrintWay releases to JES all data sets that have been retained after successful or unsuccessful transmission to the target system and all data sets that are waiting to be retried. These data sets can be processed by another IP PrintWay FSA or can be reselected by the same IP PrintWay FSA when the FSA is restarted.

IP PrintWay saves routing, retry, and retention information when it releases a data set to JES. When IP PrintWay reselects a data set that has already been processed, IP PrintWay uses the saved information to resume processing at the correct point. IP PrintWay retransmits the data set if the retry limit has not yet been reached and deletes the data set from the JES spool if the retention time has expired.

After an IP PrintWay FSA stops and releases data sets to JES, you can use JES or SDSF commands to modify the output class, form name, and destination of the released data sets. IP PrintWay, however, does not use the new class, form name, or destination to locate a new printer definition; instead, IP PrintWay uses the saved routing information.

Note: After IP PrintWay releases a data set to JES, IP PrintWay ignores any changes you make to the host name, IP address, URL, LU name, print queue name, port number, logmode, retry and retention parameters, and name of Inventory components that contain print options.

Stopping an FSS

Before stopping an FSS, you must stop all FSAs under its control. If the FSS was configured with the AUTOSTOP=YES option on the JES2 FSS(*fss_name*) statement, JES2 stops the FSS automatically after you have stopped all FSAs. In a JES3 environment, JES automatically stops the FSS after you stop all FSAs under its control.

If JES does *not* automatically stop the FSS, use the following MVS operator command to stop the FSS after stopping all FSAs under its control:

C *fss_name*

Replace *fss_name* with one of the following:
• In JES2, the name on the JES FSS(*fss_name*) statement
• In JES3, the name in FSSNAME parameter of the JES FSSDEF statement

Terminating an FSA

If you are not able to stop an FSA with the commands described in "Stopping an FSA" on page 46, in both JES2 and JES3, you can use the MODIFY command with the FORCE parameter. The syntax of this command is as follows:

```
┌─ Syntax ─────────────────────────────────────────────────────
│
│  {MODIFY │ F} fss_name,FORCE,fsa_name
│
```

where:

fss_name   Specifies the name of the FSS that manages the FSA. The *fss_name* parameter must match the FSSNAME parameter of the JES FSSDEF statement for the FSS.

FORCE   Specifies that the FSA is to be stopped.

fsa_name   Specifies the FSA to be stopped.

> **Note:** IP PrintWay issues ANFM027I when the FORCE parameter is processed. If the FSA is tracing to an external trace data set when the FORCE parameter is issued, a C03 system abend may result for the trace data set when the FSS address space is terminated.

If the MODIFY command is unsuccessful on JES3 systems, enter the following JES3 command:

```
*FAIL,fsa_name
```

Starting Sendmail

If you plan to use IP PrintWay to send print output to e-mail destinations, you must start z/OS UNIX sendmail. You should start sendmail as a daemon so that sendmail can receive messages.

Example: The following commands switch to an effective UID of 0 and start sendmail. The **-bd** option starts sendmail as a daemon, and the **-q** option specifies that sendmail is to look in its queue to process pending mail every minute:

```
su
/usr/sbin/sendmail  -bd  -q1m
```

To use the **su** command, you must be permitted to the BPX.SUPERUSER profile in the FACILITY class within RACF.

To start sendmail automatically, you can put the **sendmail** command in the **/etc/rc** file.

Using SDSF Commands

You can use System Display and Search Facility (SDSF) commands or the commands of a comparable product to start and stop FSAs. *Before* IP PrintWay selects the data set for processing, you can use SDSF commands to change the class, form name, destination, host name or IP address, print-queue name, name of Printer Inventory components that contain print options, retry time, retry limit, and retention times for a data set on the JES spool

> **Note:** If IP PrintWay has stopped and released data sets to JES, do not change the host name or IP address, print-queue name, component name, retry time, retry limit, or retention times. IP PrintWay ignores any changes you make to these values.

Refer to *z/OS SDSF Operation and Customization* for more information about SDSF commands.

Chapter 6. Maintaining the IP PrintWay Transmission Queue

After IP PrintWay selects data sets from the JES spool for transmission, you *cannot* use JES or SDSF commands to manage the data sets. You can, however, use Infoprint Server ISPF panels to monitor, reroute, retransmit, and delete data sets that IP PrintWay has selected.

Data sets that IP PrintWay has selected are on the IP PrintWay transmission queue. This queue contains an entry for each data set being processed. Each entry contains the status of the transmission of the data set, routing information, and transmission options.

IP PrintWay initially creates a queue entry for each data set to be transmitted. IP PrintWay retains the queue entry until either (1) IP PrintWay deletes the data set from the JES spool or (2) the IP PrintWay FSA processing the data set ends normally or abnormally and releases the data sets it is processing back to JES so that another IP PrintWay FSA can process them.

Under usual circumstances, you do not need to maintain the IP PrintWay transmission queue because IP PrintWay retains queue entries and deletes queue entries automatically. IP PrintWay retains and deletes entries based on retry and retention parameters specified either in the printer definition or in the JCL for each data set, as follows:

- If the transmission of a data set is successful, IP PrintWay retains the queue entry until the retention period specified for successful transmissions has expired and then automatically deletes the queue entry.
- If the transmission of a data set fails, that is, the transmission is still unsuccessful after being retried the requested number of times, IP PrintWay retains the queue entry until the retention period specified for failed transmissions has expired and then automatically deletes the queue entry.

If all IP PrintWay FSAs stop processing, the transmission-queue should be empty. If any entries do remain, delete the entries or reallocate the data set before restarting IP PrintWay. If you reallocate the data set, you must also reinitialize it, as described in *z/OS Infoprint Server Customization*.

If your installation has used Security Server (RACF) or a similar product to protect the IP PrintWay transmission-queue data set, you may not be authorized to perform some or all of these functions. If, for example, you have read-only access to the IP PrintWay transmission-queue data set, you are allowed to list and browse entries, but not hold, reset, modify, or delete them. The Infoprint Server ISPF panels show only those functions you are allowed to perform.

Note: Do *not* use VSAM editing functions to change any records in the IP PrintWay transmission-queue data set.

Starting an Infoprint Server ISPF Session

To maintain the IP PrintWay transmission queue using ISPF panels, you must first start an Infoprint Server ISPF session. For information, see "Starting the ISPF Session and Configuring the Panels" on page 217. Online help is available for each panel, input field, and message. To obtain help, press the HELP function key.

Listing Transmission-Queue Entries

You must display a list of transmission-queue entries before you can perform other functions, such as browsing or modifying an individual entry. You can either list all transmission-queue entries, or you can select the entries you want to list.

Listing All Transmission-Queue Entries

Follow these steps to display a list of all entries on the IP PrintWay transmission queue:

1. On the Infoprint Server: Printer Inventory Manager panel, select **5 PrintWay Queue** and press Enter.
2. On the IP PrintWay Transmission Queue Selection panel:
   a. Change the name of the transmission-queue data set, if necessary. The name of the transmission-queue data set represents the data set that IP PrintWay uses when displaying and updating entries.

      During an ISPF session, you can work with multiple transmission-queue data sets. For example, if your installation has defined multiple IP PrintWay FSSs, you might need to access the transmission-queue data set for each FSS. To change the name of the data set during your ISPF session, change the name on the IP PrintWay Transmission Queue Selection panel.

      If you do not change the name of this data set, IP PrintWay uses name ANF.QUEUE.
   b. Leave all other selection fields blank.
   c. Press Enter to display the IP PrintWay Transmission Queue panel.
3. On the IP PrintWay Transmission Queue panel:
   a. Press Enter at any time to obtain a current list.
   b. Press the END function key to exit the list.

Listing Selected Transmission-Queue Entries

You can select entries based on one or more of the following characteristics of queue entries:
- Printer definition name
- Class, form, and destination name
- Job name
- Date the data set arrived on the IP PrintWay transmission queue
- Time the data set arrived on the IP PrintWay transmission queue
- Status of the transmission
- Port number of the socket
- Name of the print queue
- VTAM logmode
- Host name, IP address, URL, or VTAM LU name of the printer or print server
- E-mail addresses

Follow these steps to display a list of selected queue entries:

1. On the Infoprint Server: Printer Inventory Manager panel, select **5 PrintWay Queue** and press Enter.
2. On the IP PrintWay Transmission Queue Selection panel:
   a. Change the name of the transmission-queue data set, if necessary. If your installation has defined multiple transmission-queue data sets, use this panel several times to list entries in all transmission-queue data sets.

b. Type values in one or more fields to specify selection criteria. To be listed, transmission-queue entries must meet *all* of the criteria you specify. Leave blank any fields that you do not want IP PrintWay to consider in selecting entries.

You can use an asterisk (*) in the following ways:
- By itself to mean any value.
- At the start of a string (*ABC matches values ending with ABC)
- At the end of a string (ABC* matches values starting with ABC)
- As a part of the date or time field, for example: `*/03/*` or `9:*:*`

If you enter a value in the **Print Queue/Logmode** or **Host Name/IP Address/URL/LUName/e-mail** field, use the same lower and uppercase characters that are specified in the transmission-queue entry. Although these fields can contain up to 255 characters, this panel only allows you to enter 185 characters. If necessary, use the asterisk (*) to select longer names.

Note: You cannot use an asterisk as a wild card in the **Port Number** field.

c. Press Enter.

3. On the IP PrintWay Transmission Queue panel:

a. A hyphen (-) in front of the name in the **Route Name** field indicates that the entry represents a single data set; the data set grouping specified in the printer definition is either **None** or **Job**. An asterisk (*) in front of the name indicates that the entry represents one or more data sets that belong to a concatenation; the data set grouping specified in the printer definition is **Concatenate Job**. See "Transmitting Multiple Data Sets in a JES2 Output Group" on page 174 for more information about grouping data sets.

b. Press Enter at any time to obtain a current list.

c. Press the END function key to exit the list.

Browsing a Transmission-Queue Entry

When you browse an entry on the IP PrintWay transmission queue, you can view fields, but you cannot change any of them. If a field in an entry is blank when you browse it, it means that IP PrintWay uses a default value for the field.

When the name in the **Route Name** field is preceded by an asterisk, the data displayed is from the first data set of the concatenation.

Follow these steps to browse the entry:

1. List the entry or entries that you want to browse, as described in "Listing Transmission-Queue Entries" on page 50.

2. On the IP PrintWay Transmission Queue panel, type **B** in the **Action** column in front of the entries you want to browse, and press Enter.

3. On the IP PrintWay Transmission Queue Entry panel, press the END function key when you want to exit the panel.

Holding a Transmission-Queue Entry

To prevent IP PrintWay from transmitting or automatically deleting a data set on the IP PrintWay transmission queue, you can hold the queue entry; however, you *cannot* hold the queue entry for a data set that IP PrintWay is currently transmitting to its target destination.

When you hold an entry, IP PrintWay retains the data set on the JES spool and changes the status to H (hold). When an entry is in the hold status (H), you can delete, modify, or reset it.

You can hold an entry for an individual data set, all entries for a selected list of data sets, or all entries with a certain name on a selected list. When you hold an entry whose name in the **Route Name** field is preceded by an asterisk, all data sets in the concatenation are held.

To restore a queue entry to its original status, hold the entry again. IP PrintWay restores the original status of any entry that is already in the hold status.

Holding a Queue Entry

Follow these steps to hold one or more individual queue entries:

1. List the entry or entries that you want to hold, as described in "Listing Transmission-Queue Entries" on page 50.
2. On the IP PrintWay Transmission Queue panel, type **H** in the **Action** column in front of the entries you want to hold, and press Enter.

Holding All Transmission-Queue Entries in a List

You can hold a list of transmission-queue entries, selected based on criteria such as printer definition name, status, address of the printer, and so on. You can also hold only those entries in the list that have a specified route name. The route name is displayed in the **Route Name** field and contains either the printer definition name or the CLASS, FORM, and DEST values specified in the printer definition.

Follow these steps to hold a list of queue entries:

1. List the entries that you want to hold, as described in "Listing Transmission-Queue Entries" on page 50.
2. On the IP PrintWay Transmission Queue panel, enter one of the following on the command line:

   a. `HOLD` to hold all entries in the list

   b. `HOLD routename` to hold all entries in the list with the specified name in the **Route Name** field.

3. To exit the panel, press the END function key.

Resetting a Transmission-Queue Entry

To retransmit a data set on the IP PrintWay transmission queue, you can reset its queue entry; however, you *cannot* reset the queue entry for a data set that IP PrintWay is currently transmitting to its target destination.

When you reset a queue entry, IP PrintWay retransmits the data set as soon as possible as if this were the first transmission attempt. Before you reset a queue entry, you can modify the entry and change routing information, formatting options, and translation options. See "Modifying a Transmission-Queue Entry" on page 53 for information.

You can reset an entry for one data set or you can reset entries for a list of data sets. When you reset an entry whose name in the **Route Name** field is preceded by an asterisk, all data sets in the concatenation are reset.

When you reset an entry, IP PrintWay automatically changes the following fields:

- The **Transmission Status** field is set to Z (queued for first attempt).
- The **Next Activity** field is set to the current date and time.
- The **Retries** field is set to 0.

Resetting a Queue Entry

Follow these steps to reset one or more queue entries:

1. List the entry or entries that you want to reset, as described in "Listing Transmission-Queue Entries" on page 50.

2. On the IP PrintWay Transmission Queue panel:

   a. If you want to change routing or options information in the entry before resetting it, type **E** in the **Action** column in front of the entries you want to edit and press Enter. Edit the entries and then press the END function key.

   b. Type **R** in the **Action** column in front of the entries you want to reset, and press Enter.

Resetting All Queue Entries in a List

You can reset an entire list of queue entries, selected based on criteria such as printer definition name, status, address of the printer, and so on. You can also reset only those data sets in the list that have a specified route name. The route name is displayed in the **Route Name** field and contains either the printer definition name or the CLASS, FORM, and DEST values specified in the printer definition.

Follow these steps to reset a list of queue entries:

1. List the entries that you want to reset, as described in "Listing Transmission-Queue Entries" on page 50.

2. On the IP PrintWay Transmission Queue panel, enter one of the following on the command line:

   - RESET to reset all entries in the list

   - RESET *routename* to reset all entries in the list with the specified name in the **Route Name** field.

3. To exit the panel, press the END function key.

Modifying a Transmission-Queue Entry

You can edit fields in a transmission-queue entry only if IP PrintWay is not currently transmitting the data set to its target destination; that is, the status of the entry cannot be A (active). When you edit a field, the change takes effect immediately. If, for example, you change the address of the target system, IP PrintWay uses the new address when it next transmits the data set.

When you modify an entry whose name in the **Route Name** field is preceded by an asterisk, the asterisk indicates that the entry contains data for the first data set of the concatenation. Except for LPR options, changes you make to this entry affect *all* data sets in the concatenation. For example, if you change the retry time for an entry, the retry time is changed for all the data sets in the concatenation because all the data sets are sent together. Because IP PrintWay allows different LPR options for individual data sets of a concatenation, changes you make to the LPR options field apply only to the *first* data set of the concatenation.

Attention: While you are editing a queue entry, IP PrintWay does *not* transmit the data set or any other data sets scheduled for transmission to the same target address; therefore, make your changes and press the END function key as quickly as possible. If you take longer than 12 minutes, IP PrintWay proceeds with transmission of data sets to the target system.

You can perform the following tasks by modifying a queue entry:
- Reroute a data set to a different print queue
- Retain the data sets on the JES spool for a shorter or longer time
- Expedite or delay the next retry attempt
- Increase or decrease the number of retry attempts
- Change formatting options for the next transmission of the data set
- Change translation options for the next transmission of the data set

These tasks are explained more fully below.

Follow these steps to modify an entry:
1. List the entries to modify, as described in "Listing Transmission-Queue Entries" on page 50.
2. On the IP PrintWay Transmission Queue panel, type **E** in the **Action** column in front of the entries you want to edit, and press Enter.
3. On the IP PrintWay Transmission Queue Entry panel:
   a. Edit the fields as necessary. Press Enter to validate the fields.
   b. To save the queue entry, but maintain the panel on the screen, enter **SAVE** on the command line. You can now continue editing the entry

   To save the options entry and exit the panel, press the END function key.

   To exit the panel without saving your changes, enter **CANCEL** on the command line.

Rerouting a Data Set

To reroute a data set to another destination, change the routing information in the following fields:
- If the transmission protocol is LPR, specify the **Host/IP Address/URL/LUName** and **Print Queue/Logmode** fields.
- If the transmission protocol is SOCKET, specify the **Host/IP Address/URL/LUName** and **Port Number** fields.
- If the transmission protocol is IPP, specify the **Host/IP Address/URL/LUName** field.
- If the transmission protocol is VTAM, specify the **Host/IP Address/URL/LUName** and **Print Queue/Logmode** fields.
- If the transmission protocol is e-mail, specify the **Host/IP Address/URL/LUName/e-mail** field.

If the status of the queue entry is S (succeeded), F (failed), or H (entry held), you must reset the entry after you change the routing information. Resetting the entry causes IP PrintWay to retransmit the data set. See "Resetting a Transmission-Queue Entry" on page 52 for information.

If the status of the queue entry is Z (queued for first attempt), or R (queued for retry), do not reset the entry after you change the routing information.

Changing Retention Periods

To retain a queue entry with a status of Z (queued for first attempt) or R (queued for retry) for a longer or shorter time, change the **Retain Time: Success** or **Retain Time: Failure** fields. Type **FOREVER** in the **Retain Time** field if you want IP PrintWay to retain the queue entry forever.

To retain a queue entry with a status of S (succeeded) or F (failed) for a longer or shorter time, change the date and time in the **Next Activity** field. Type **NEVER** in the **Next Activity Date** and **Next Activity Time** fields if you want IP PrintWay to retain the queue entry forever.

Changing the Time Between Retries

To increase or decrease the time between retries of a queue entry with a status of Z (queued for first attempt) or R (queued for retry), change the time in the **Retry: Time** field. The new retry time takes effect after the next transmission.

To retransmit the data set immediately, reset the queue entry, as described in "Resetting a Transmission-Queue Entry" on page 52.

Changing the Retry Limit

To increase or decrease the retry limit for a queue entry with a status of Z (queued for first attempt) or R (queued for retry), change the retry limit in the **Retries** field. To stop retry attempts, change the retry limit in the **Retries** field to 0.

To retry a failed transmission (status F), increase the retry limit in the **Retries** field. Also, change the date and time in the **Next Activity** field to the time you want for the next retry attempt.

Note: You can also retry a failed transmission by resetting the queue entry, as described in "Resetting a Transmission-Queue Entry" on page 52.

Changing the Maximum Document Size and Response Timeout Value

To increase or decrease the maximum number of bytes that IP PrintWay can transmit to the printer, specify the number of bytes in the **Maximum document size** field. This field does not apply when the VTAM protocol is used. IP PrintWay uses the new size when it retransmits the data set.

To increase or decrease the number of seconds that IP PrintWay waits for a response from the printer, change the value in the **Response timeout** field. This field does not apply when the e-mail protocol is used. IP PrintWay uses the new value when it retransmits the data set.

If the status of the queue entry is S (succeeded), F (failed), or H (entry held), you must reset the queue entry after you change the values. Resetting the entry causes IP PrintWay to retransmit the data set. See "Resetting a Transmission-Queue Entry" on page 52 for information.

If the status of the queue entry is Z (queued for first attempt), or R (queued for retry), do not reset the entry after you change the values.

Changing Formatting Options

To change the formatting options and formatting rules of a data set, select **Change Formatting Options** and press Enter. Edit the fields in the Formatting Options Entry panel. IP PrintWay uses the new formatting options and formatting rules when it retransmits the data set.

If the status of the queue entry is S (succeeded), F (failed), or H (entry held), you must reset the queue entry after you change the formatting options and rules. Resetting the entry causes IP PrintWay to retransmit the data set. See "Resetting a Transmission-Queue Entry" on page 52 for information.

If the status of the queue entry is Z (queued for first attempt), or R (queued for retry), do not reset the entry after you change the formatting options and rules.

Changing Translation Options

To change the translation options of a data set, select **Change Translation Options** and press Enter. Edit the fields in the translation Options Entry panel. IP PrintWay uses the new translation options when it retransmits the data set.

If the status of the queue entry is S (succeeded), F (failed), or H (entry held), you must reset the queue entry after you change the translation options. Resetting the entry causes IP PrintWay to retransmit the data set. See "Resetting a Transmission-Queue Entry" on page 52 for information.

If the status of the queue entry is Z (queued for first attempt), or R (queued for retry), do not reset the entry after you change the translation options.

Deleting a Transmission-Queue Entry

Under usual circumstances, you do not need to delete queue entries. IP PrintWay automatically deletes a transmission-queue entry after retrying an unsuccessful transmission the specified number of times and after the retain time specified for the data set, if any, has expired.

Under some circumstances, you may need to delete a specific queue entry. For example, if the RETAINF or RETAINS JCL parameter or the printer definition specifies a retention time of **FOREVER**, you need to delete the queue entry manually.

Follow these steps to delete a queue entry:
1. List the entries you want to delete, as described in "Listing Transmission-Queue Entries" on page 50.
2. On the IP PrintWay Transmission Queue panel, type **D** in the **Action** column in front of the queue entries you want to delete, and press Enter.
3. On the Delete Confirmation panel, press Enter to delete the entry. Press the END function key to cancel the delete request.

When you delete a transmission-queue entry, IP PrintWay also removes the data set from the JES spool.

Querying the Status of a Print Queue

If a data set did not successfully print and a data-set entry still remains on the transmission queue, you might want to query the status of the printer's queue. You can query the status of the printer's queue only if IP PrintWay used the LPR protocol to transmit the data set to the printer.

Follow these steps to query the status of the printer's queue:

1. List entries for the printer you want to query, as described in "Listing Transmission-Queue Entries" on page 50.
2. On the IP PrintWay Transmission Queue panel, type **S** (for short queue status) or **L** (for long queue status) in the **Action** column in front of the queue entry for the data set, and press Enter.

Results:

- If IP PrintWay was able to establish a connection with the printer:

```
Queue State for
   PASS
On remote host:
   9.99.176.81

2 entries
0 - port busy. No info
```

- If IP PrintWay was not able to establish a connection with the printer:

```
CONNECT ERROR
```

Chapter 7. Working with Output Data Sets on the JES Spool

This section describes how to perform the following operator tasks for data sets that Print Interface and NetSpool dynamically allocate on the JES spool:

Task	See Page:
Locating Output Data Sets Allocated by Infoprint Server	59
Redirecting Output Data Sets on the JES Spool to a Different IP PrintWay Printer	60

Locating Output Data Sets Allocated by Infoprint Server

You can use the following fields displayed by the JES2 System Display and Search Facility (SDSF), or a comparable product, to help you locate data sets that Infoprint Server has allocated on the JES spool. The information that SDSF displays in each field depends on how the print request was submitted.

If the print request was submitted in this way:	The contents of these SDSF fields are:			
	Job name	**Job ID**	**Owner**	**Last qualifier of data set name**
z/OS UNIX **lp** command or AOPPRINT JCL procedure	User ID of the job submitter[1]	Infoprint Server job ID. **lp** and AOPPRINT return this job ID to the job submitter.[2]	User ID of the job submitter	Last eight characters of the name of the file to be printed[3]
Batch job using a DD JCL statement [4]	Job name of the z/OS batch job	z/OS job ID assigned to the job. JES returns this job ID to the job submitter.	User ID of the user who started Infoprint Server daemons	Name specified in the DSNAME JCL parameter [5]
Print command or application on a remote system[6]	Name of the remote job submitter [7]	Infoprint Server job ID.[2] The job submitter *might* know the job ID.	User ID of the user who started Infoprint Server daemons	Last eight characters of the name of the file to be printed[3]
VTAM applications, such as CICS and IMS applications	Member name of the NetSpool startup procedure	z/OS job ID. The job submitter does *not* know this job ID.	User ID of the user assigned to the NetSpool started task	LU name of the VTAM application (the primary LU name)

1. The job submitter might have specified a different job name in the **sysout-job-name** job attribute.

2. The Infoprint Server job ID starts with the 2–character prefix that is defined in the Infoprint Server configuration file, **aopd.conf**. The default prefix is PS. For example, if PS is the job prefix and 143 is the job identifier, then the job ID is PS000143; the **lp** command and AOPPRINT procedure return 143 to the job submitter. The job submitter might have specified a different job ID in the **sysout-job-id** job attribute, in which case the job ID might not be unique and might not start with the Infoprint Server job prefix.

3. A # in the data set name indicates that JES does not allow the character in this field. For example, if the file to be printed is myfile.print, this field contains le#print.

4. Infoprint Server allocates the data set on the JES spool when (1) the job submitter uses the Print Interface subsystem and (2) IP PrintWay sends data sets to the Print Interface LPD, a situation that can occur when the resubmit for filtering option is selected in the printer definition.

5. A ? in the data set name indicates that the DSNAME parameter was not specified.

6. Print commands include the **lpr**, **enq**, **lp**, and **print** commands. Job submitters can also print from a remote system using SAP R/3 or a standard Windows print submission method.

7. If the document was submitted with an **lpr** command, this is the user ID specified in the P control code in the LPD control file. If the user ID is unknown, the job name might contain UNKNOWN or ANONYMOU. A # in the name indicates that the name contains a character that JES does not allow.

Tips:

- JES commands might return a different job ID from the job ID that SDSF displays. JES commands display the z/OS job ID that z/OS assigns to the data set. If the Print Interface subsystem allocated the data set on the JES spool, then the JES commands return the same job ID as SDSF displays.

- The fully-qualified data set name might not contain the same values as SDSF displays. For example, the job ID in the fully-qualified data set name is always a job ID assigned by z/OS to the data set. The job ID in the data set name matches the job ID displayed by SDSF only for data sets that NetSpool allocates on the JES spool.

- If Print Interface or NetSpool has already converted EBCDIC data to ASCII, using approximately 32K byte records, you might not be able to use your standard tools to view the data on the spool.

- When a user requests more than 255 copies of the same data set, multiple output groups for the data set are created on the JES spool. Each output group has the same user ID and job ID. To delete the data set, you must individually delete all output groups for the same data set.

Redirecting Output Data Sets on the JES Spool to a Different IP PrintWay Printer

In some situations, you might need to redirect a data set on the JES spool from one printer controlled by IP PrintWay to another printer controlled by IP PrintWay. In some cases, to redirect a data set you can change the DEST, CLASS, or FORMS parameters of the data set before IP PrintWay selects the data set for printing. When you change the DEST, CLASS, and FORMS parameters, IP PrintWay selects a different printer definition in the Printer Inventory to process the data set.

However, when Print Interface or NetSpool allocates a data set on the JES spool, IP PrintWay does not use the DEST, CLASS, and FORMS parameters to select the printer definition; instead, IP PrintWay always uses the *same* printer definition that Print Interface and NetSpool used, in order to ensure that all components of Infoprint Server use the information in the same printer definition to process a data set. This means that changing the DEST, CLASS, and FORMS parameters does not affect which printer definition IP PrintWay uses to process the data set.

You can, however, redirect an output data set to a different IP PrintWay printer *after* IP PrintWay has selected the data set from the JES spool for processing. You can use the Infoprint Server ISPF panels to edit the entry for that data set on the IP PrintWay transmission-queue and redirect the data set to another printer. To redirect the data set, specify a different printer address in the transmission-queue entry; see "Modifying a Transmission-Queue Entry" on page 53 for more information.

Also, if the job submitter specifies the name of a printer definition on the DD or associated OUTPUT JCL statement (in the FSSDATA or SUBSYS parameter), you cannot redirect the output data set to a different IP PrintWay printer until after IP PrintWay selects the data set from the JES spool for processing. This is because IP PrintWay always uses the printer definition name, if one is specified, to select the printer definition and you cannot change the name of the printer definition on the JES spool.

Tips:

1. To redirect all data sets to a different printer, the administrator can use the Infoprint Server ISPF panels to change the address of the printer in the printer definition.

2. If you want the ability to redirect data sets on the JES spool before IP PrintWay selects a data set, job submitters cannot use the Print Interface subsystem, and they must omit the FSSDATA JCL parameter on the OUTPUT JCL statement. When the Print Interface subsystem is not used, job submitters can specify the DEST, CLASS, and FORMS JCL parameters to specify the printer definition for IP PrintWay to use. The administrator must ensure that printer definitions can be selected with the DEST, CLASS, and FORMS parameters. See "Using DEST, CLASS, and FORMS to Select a Printer Definition" on page 167 for more information.

Chapter 8. Viewing Messages

This section describes how you can view messages issued by:
- NetSpool
- IP PrintWay
- Infoprint Server Transforms
- Other components of Infoprint Server, such as Print Interface
- z/OS UNIX sendmail

Viewing NetSpool Messages

All NetSpool messages are issued to the operator console. If the optional NetSpool message log data set is specified in the NetSpool startup procedure, then NetSpool issues all messages to this data set as well. You can view the NetSpool messages by browsing the data set.

Viewing IP PrintWay Messages

IP PrintWay issues a message to the IP PrintWay message-log data set when it receives a data set from JES, when IP PrintWay successfully or unsuccessfully transmits the data set to the target printer or e-mail destination, and when IP PrintWay releases the data set to JES. Also, IP PrintWay writes other messages to this data set, and IP PrintWay installation exits can write messages to this data set.

The messages wrap around to the beginning when the data set becomes full. The time-stamp preceding each message indicates when IP PrintWay wrote the message. IP PrintWay writes a string containing equal signs, ========, at the end of the last message written.

Your installation can write an IP PrintWay Message exit to suppress unwanted messages from the message-log data set. Refer to *z/OS Infoprint Server Customization* for more information.

Follow these steps to view the messages:
1. Start an Infoprint Server ISPF session.

   For information about how to start an Infoprint Server ISPF session, see "Starting the ISPF Session and Configuring the Panels" on page 217.
2. On the main Infoprint Server ISPF panel, select: **7 Configure**.

   Ensure that the **Message log** field contains the name of the IP PrintWay message log used by the IP PrintWay functional subsystem (FSS). This name must match the data set name specified in the IP PrintWay startup procedure.
3. On the main Infoprint Server ISPF panel, select: **6 PrintWay Message**.
4. To find the latest message, press the REFRESH function key on the Infoprint Server ISPF panels, or search for a string of equal signs.

Viewing Infoprint Server Transforms Messages

The transform daemons issue messages to message logs located in the **xfd** subdirectory in the base directory defined in the Infoprint Server configuration file (**aopd.conf**); the default base directory is **/var/Printsrv/**.

Each instance of a transform daemon writes messages to its own message log. The message log is cleared when you restart the Transform Manager.

The file name of the message logs have the format *transform*.*n*.**stderr**, where:

transform   Is the name of the transform with the error. The transform name includes the name of the transform class if one is defined; for example, `pcl2afp` or `pcl2afp_letter_300`.

n   Is the instance of the transform daemon.

Viewing Other Infoprint Server Messages

Infoprint Server messages that are issued by components of Infoprint Server other than NetSpool, IP PrintWay, or Infoprint Server Transforms are directed either to (1) the user or operator who submitted the job or (2) the system console. These messages are not issued to a log.

Viewing z/OS UNIX Sendmail Messages

When IP PrintWay transmits output to an e-mail destination, it uses the z/OS UNIX sendmail facility. Sendmail returns an error message when it cannot deliver an e-mail:

- If the target e-mail address is for a *local* system, the sendmail error message is recorded in the IP PrintWay message log.
- If the target e-mail address is for a *remote* system, no error message is recorded in the IP PrintWay message log. Sendmail instead sends a message about the failed delivery to one of the following users:
  - If the e-mail address was specified in a sendmail alias, sendmail notifies the owner of the alias.
  - If the e-mail address was specified directly in the printer definition, or if no owner is specified for the alias, then sendmail notifies the user associated with the IP PrintWay startup procedure. This user ID is AOPSTC if your installation used the user ID suggested in *z/OS Infoprint Server Customization*.

You might need to wait several days before sendmail returns an error message to you about an e-mail that could not be delivered to a remote system. How long you need to wait depends in part on how long it takes the remote system to notify sendmail that an e-mail is not deliverable and in part on how your installation has customized sendmail. Refer to *z/OS Infoprint Server Customization* for more information about customizing sendmail timeout values.

To receive messages from sendmail, run the z/OS UNIX **mail** or **mailx** command. Refer to *z/OS UNIX System Services Command Reference* for information about these commands.

Part 3. Administration

Chapter 9. Administration Roadmap

This chapter can help you determine which administrative tasks you need to perform to use the Infoprint Server components customized by your installation. Table 3 lists the components of Infoprint Server, the administrative tasks, and the sections in this publication that describe the required tasks.

Table 3. Summary of Infoprint Server Components and Administrative Tasks

Component	Tasks	See Page:
Printer Inventory Manager	Plan the Printer Inventory.	79
	Use ISPF panels to manage the Printer Inventory.	217
		233
	Use the Printer Inventory Definition Utility (PIDU) to manage the Printer Inventory.	
Print Interface	Plan printer definitions for Print Interface.	93
Infoprint Server Transforms	Request transforms in printer definitions.	201
NetSpool	Plan printer definitions and printer pool definitions for NetSpool.	121
	Define NetSpool printer logical units (LU)s to VTAM.	213
IP PrintWay	Create FSS definitions for IP PrintWay.	89
	Create FSA definitions for IP PrintWay.	91
	Plan printer definitions for IP PrintWay.	145
	Use SMF type-6 accounting record written by IP PrintWay.	357
SNMP subagent	Create FSS definitions for PSF for OS/390.	90
	Create FSA definitions for PSF for OS/390 and enable SNMP reporting.	91

Chapter 10. Planning the Printer Inventory

This chapter contains information to assist you in planning your Printer Inventory. The Printer Inventory consists of HFS files that contain information about your printing environment.

The Printer Inventory can contain the following types of objects, called definitions:

- *Printer definitions*, which describe the printers in your system. The printers can be controlled by IP PrintWay, PSF for OS/390, or JES.

  A printer definition can also describe an e-mail destination, which can be one e-mail address or a list of e-mail addresses.

  Printer definitions can optionally include Inventory objects called *components*. Components let you specify, in one object, information that is common to several printer definitions.

- *Printer pool definitions*, which describe groups of printer definitions to which you want to broadcast data. You can only broadcast data from VTAM applications that is processed by NetSpool.

- *FSS definitions*, which describe the IP PrintWay and PSF for OS/390 functional subsystems (FSSs) that the system programmer has defined to your JES system.

- *FSA definitions*, which describe the IP PrintWay and PSF for OS/390 functional subsystem applications (FSAs) that the system programmer has defined to your JES system.

Table 4 summarizes the types of objects you can create in the Printer Inventory and indicates when the definitions are required. Required definitions are required by all installations. Optional definitions are required only if the condition is met. See the page reference for more information about the definition.

Table 4. Printer Inventory Objects

Inventory Definition	Condition	See Page:
Printer definition	Required[1]	80
Components	Optional: To simplify administration of printer definitions	80
Printer pool definition	Optional: To broadcast data from VTAM applications through NetSpool to multiple printer definitions.	88
FSS definition for IP PrintWay	Optional: To print to VTAM-controlled printers or to customize the IP PrintWay FSS	89
FSS definition for PSF for OS/390	Required[2]	89
FSA definition for IP PrintWay	Optional: To specify unique trace parameters for the FSA	90
FSA definition for PSF for OS/390	Optional[2]	90

Table 4. Printer Inventory Objects (continued)

Inventory Definition	Condition	See Page:
1. In some cases you can support more than one printer with the same printer definition. See "One Printer Definition for Several Actual Printers" on page 82 for more information.		
2. You must create FSS and FSA definitions for PSF for OS/390 *only* if your installation configures PSF for OS/390 to use the Printer Inventory. You must configure PSF for OS/390 to use the Printer Inventory if you want to use the Infoprint Server SNMP subagent component to view printer status of certain PSF printers or if you want PSF to use printer information in FSS and FSA definitions. Refer to *PSF for OS/390 & z/OS: Customization* for information about how to configure PSF for OS/390 to use the Printer Inventory.		

To create and manage Printer Inventory definitions, you can use one of the following methods or a combination of these methods:

- **Infoprint Server ISPF panels:** The ISPF panels let you add, list, browse, copy, edit, and delete definitions. See Chapter 16, "Using ISPF Panels to Manage the Printer Inventory" on page 217 for information about how to use the ISPF panels.

- **Printer Inventory Definition Utility (PIDU):** The PIDU program lets you create, display, list, modify, rename, delete, export, and dump definitions. You might find the PIDU program convenient for creating a large number of definitions at one time or for making the same change to many definitions. See Chapter 17, "Using the PIDU Program to Manage the Printer Inventory" on page 233 for information about how to run the PIDU program.

- **Infoprint Server Migration program:** If you have configured Print Server for OS/390 V2R5 through V2R7 or if you have configured the NetSpool or IP PrintWay features of PSF for OS/390, you can use the migration program to create printer definitions in the Printer Inventory. The migration program creates printer definitions by combining printer information from your current Print Interface printer inventory, NetSpool print-characteristics data set, and IP PrintWay routing and options data sets. Refer to *z/OS Infoprint Server Migration* for more information about how to run this migration program.

  If you have configured PSF/MVS or PSF for OS/390, you can use the Infoprint Server migration program to create FSS and FSA definitions for PSF for OS/390; refer to *PSF for OS/390 & z/OS: Customization* for more information about how to run the migration program.

Planning Printer Definitions

A printer definition contains information required to send data to a printer, or in some cases, several printers in your system. A printer definition can also contain information required to send data to an electronic mail (e-mail) destination; an e-mail destination can consist of one or more e-mail addresses.

The printer can be a local printer or remote printer in your TCP/IP network or it can be a printer defined to VTAM. The printer definition contains all of the information that Print Interface and NetSpool need to allocate data sets on the JES spool. It also contains information that IP PrintWay uses to transmit data sets from the JES spool to remote printers.

Users, which can be job submitters or applications, submit print jobs to a particular printer definition by specifying the name of the printer definition. The name of a printer definition is case-sensitive and can contain up to 17 printable characters. For compatibility with previous releases of IP PrintWay, users can also select IP

PrintWay printer definitions by specifying the DEST, CLASS, or FORMS parameters on an OUTPUT JCL statement; however, users can now also select IP PrintWay printer definitions by specifying the FSSDATA=printer JCL parameter. Refer to *z/OS Infoprint Server User's Guide* for information about how to submit jobs to Infoprint Server.

Before you create printer definitions, you should understand the following topics, which are described in the following sections:

- The types of printer definitions you can create.
- How many printer definitions you need to create for each actual printer.
- The printer attributes that you can specify in the printer definitions.
- How to use components to help you manage large numbers of printer definitions.

Selecting the Type of Printer Definition

One of the first decisions to make when you plan the Printer Inventory is the type of printer definition to create for each printer or e-mail destination. The type indicates the program that sends data from the JES spool to the printer. The three types of printer definitions you can create are:

- IP PrintWay

  Select this type for TCP/IP-attached, non-AFP printers; for VTAM-controlled printers; for IBM AFP printers controlled by Infoprint Manager for AIX or Windows; and for e-mail destinations. Also select this type when you print to a printer that is TCP/IP-attached to a different z/OS system running another instance of Infoprint Server.

  When you use the Infoprint Server ISPF panels to select the printer definition type, you also must select the transmission protocol that IP PrintWay is to use to transmit data to the printer. You can select the LPR, direct sockets, Internet Printing Protocol (IPP), VTAM, or e-mail protocol. See Chapter 13, "Planning Printer Definitions for IP PrintWay" on page 145 for information about how to determine which protocol to select.

- PSF for OS/390

  Select this type for IBM AFP printers controlled by PSF for OS/390 or a comparable product. AFP printers can be locally-attached, SNA-attached, or TCP/IP-attached.

- General

  Select the General type for printers that do not fall into the other two categories. For example, you select General for line printers controlled by JES.

Following is the ISPF screen you use to select the type of printer:

```
                  Choose a Definition Type and Protocol
   Option ===>   _
     Type            Protocol
   1 IP PrintWay     LPR
   2 IP PrintWay     direct sockets
   3 IP PrintWay     IPP
   4 IP PrintWay     VTAM
   5 IP PrintWay     e-mail
   6 PSF for OS/390
   7 General
```

Note: Select the type of definition carefully because Infoprint Server processing differs according to the selected type. For example, if the printer definition type is PSF for OS/390, Print Interface converts text data to line data before

placing it on the JES spool. Also, if the printer definition type is IP PrintWay, the Infoprint Server ISPF panels let you specify information specific to IP PrintWay, such as the IP address of the target printer.

Determining How Many Printer Definitions to Create

In general, you must create one printer definition to represent each actual printer and each e-mail destination. However, in some cases, you might need to create one printer definition to represent several actual printers, or you might need to create several printer definitions to represent one actual printer.

One Printer Definition for One Actual Printer

This is the most common configuration for all types of printer definitions. In this configuration, you create one printer definition for each print queue or printer and for each e-mail destination. This configuration lets job submitters direct output to a specific printer or e-mail destination.

Note that you can use the same printer definition to process different types of data. For example, you can use the same printer definition for printing data submitted by VTAM applications; data submitted by workstation applications; and data submitted from TSO.

Each printer definition can be associated with only one NetSpool printer LU name; therefore, if your installation needs to print to the same actual printer using different printer LU names, you need to create more than one printer definition for the same printer.

To work in this configuration, the JES work-selection criteria for each PSF functional subsystem application (FSA) must be unique. For example, one FSA could be defined to JES with work-selection criterion of destination BLDG5, while the other printer FSA could be defined with work-selection criterion of destination BLDG6. For information about specifying JES work-selection criteria, refer to *z/OS JES2 Initialization and Tuning Guide* or *z/OS JES3 Initialization and Tuning Guide*.

One Printer Definition for Several Actual Printers

This configuration is possible for PSF for OS/390 or General printer definitions. In this configuration, you would create one printer definition for several actual printers. This configuration lets JES balance the workload among a group of PSF for OS/390 or JES actual printers. Job submitters can direct output to the printer definition for printing on any one of the actual printers selected by JES.

To work in this configuration, the JES work-selection criteria for each PSF FSA must be the same. For example, both FSAs could have the work-selection criterion of class E and destination BLDG5. For information about specifying JES work-selection criteria, refer to *z/OS JES2 Initialization and Tuning Guide* or *z/OS JES3 Initialization and Tuning Guide*.

If you want to minimize the number of printer definitions, you can create one printer definition for several actual printers in the following situations:

- If several printers are controlled by IP PrintWay and all job submitters can specify the address of the target printer, you can create one printer definition for all printers that share the same characteristics. In this case, each job submitter must specify the printer's IP address and either print queue name or port number on the OUTPUT JCL statement or in Infoprint Server job attributes. See "Selecting the LPR Protocol" on page 146 and "Selecting the Direct Sockets Protocol" on page 149 for more information.

- If several printers are controlled by PSF for OS/390 and the Print Interface subsystem is always used to submit print requests to the printers, you can create one printer definition for all printers that share the same characteristics. In this case, each job submitter must specify the printer's work-selection criteria, for example the printer's CLASS and DEST values, on the OUTPUT JCL statement. See "Using the Print Interface Subsystem" on page 112 for more information.

Recommendation: Create one printer definition for each printer so that all job submission methods can be used to print to a printer, including those job submission methods that do not permit the specification of the JES output class, destination name, or IP address. For example, the **lp** command does not let you specify the JES output class or destination name. And, when the IP PrintWay resubmit for filtering function is used, the printer's IP address cannot be specified on the OUTPUT JCL statement.

Several Printer Definitions for One Actual Printer
You might need to create more than one printer definition for the same actual printer or print queue in the following situations:
- To print documents with different requirements to the same actual printer or print queue. For example, to print documents on a PSF for OS/390 printer with different overlays. You would create two printer definitions for the actual printer. In one printer definition, specify the name of one overlay; in the other printer definition, specify the name of the other overlay.

  As an alternative, job submitters who use the **lp** command or an OUTPUT JCL statement can specify the name of the overlay during job submission; however not all job-submission methods allow specification of job attributes such as an overlay name.
- To print VTAM application data to the same actual printer with different requirements. For example, to print to the same printer with different NetSpool end-of-file rules, you would create two printer definitions with two different NetSpool printer LU names.
- To print ASCII or formatted data (such as PCL data) and EBCDIC data to the same IP PrintWay print queue from the local z/OS system using an OUTPUT JCL statement to submit the print job. See "Printing Data Without Formatting" on page 185 for information.

Specifying Attributes in a Printer Definition
The characteristics of a printer and print jobs that you specify in a printer definition are called printer attributes. When you use ISPF panels to create or edit printer definitions, you specify printer attributes as values in panel fields. If you use the Printer Inventory Definition Utility to create or edit printer definitions, you specify printer attributes as keyword and value pairs. Although you can specify many attributes in a printer definition, you do not need to specify all of them because Infoprint Server and JES supply default values for many of the attributes.

Some attributes are used by all components of Infoprint Server; however, other attributes are used only by one component of Infoprint Server. Therefore, depending on which components of Infoprint Server you plan to use in your installation, you might not need to specify all of the attributes. For example, if you do not plan to use NetSpool to print VTAM application data, then you do not need to specify attributes that only NetSpool uses. The online help for each panel field describes which components use the field.

Most of the attributes that you can specify in a printer definition are divided into logical groups called sections. The six sections of a printer definition are: Allocation,

Processing, NetSpool Options, NetSpool End-of-File, IP PrintWay Options, and
Protocol. Figure 10 shows the different types of printer definitions and the sections
that each type contains.

IP PrintWay Printer Definitions
Allocation
Processing
NetSpool Options
NetSpool End-of-File
IP PrintWay Options
Protocol

PSF for OS/390 Printer Definitions
Allocation
Processing
NetSpool Options
NetSpool End-of-File

General Printer Definitions
Allocation
Processing
NetSpool Options
NetSpool End-of-File
IP PrintWay Options

Figure 10. Sections of Printer Definitions

Appendix B, "ISPF Panels" on page 373 shows the panels that you use to specify
attributes in a printer definition.

Allocation Section

The Allocation section contains attributes that tell NetSpool and Print Interface how
to allocate output data sets on the JES spool. For example, in this section you can
specify the output class, destination name, job priority, and so on.

Each attribute in the Allocation section corresponds to a parameter that you can
specify on an OUTPUT JCL statement. See "Allocation Attributes and
Corresponding OUTPUT or DD Statement Parameters" on page 363 for a table that
shows all field names in the Allocation section and the corresponding OUTPUT
parameters. Because each field corresponds to an OUTPUT parameter, if you need
more information about any of the attributes in this section, refer to *z/OS MVS JCL
Reference*.

Some print-submission methods let the user specify the same attributes that you
can specify in the Allocation section; in this case, the attribute specified during job
submission overrides the attribute in the printer definition. For example, if the **lp**
command contains the **form-definition** attribute, Print Interface allocates the job on
the JES spool with the form definition name on the **lp** command.

"ISPF Panel for Allocation Section or Component" on page 375 shows the panel
that you use to specify attributes in the Allocation section of a printer definition.

Processing Section

The Processing section contains attributes that tell NetSpool, Print Interface, and IP
PrintWay how to process data. For example, in this section you can specify
attributes that control the page-formatting performed by NetSpool and IP PrintWay
and attributes that control data transforms performed by Print Interface.

The Processing section also contains attributes that Print Interface and IP PrintWay
use to determine whether the document can print on the printer; these are called
validation attributes. If the document cannot print on the printer, Print Interface
rejects the print request, and IP PrintWay places the job on the system hold queue.
For example, you can specify the types of data formats that the printer supports,
the maximum size job that can print, and so on.

"ISPF Panel for Processing Section or Component" on page 376 shows the panel
that you use to specify attributes in the Processing section of a printer definition.

NetSpool Options Section

The NetSpool Options section contains attributes that tell NetSpool how to convert the input data stream before writing the data to the JES spool. NetSpool can convert the input data stream to either a line or PCL data stream. Or, you can request that NetSpool write the input data stream without change to the JES spool. "ISPF Panel for NetSpool Options Section or Component" on page 377 shows the panel that you use to specify attributes in the NetSpool Options section of a printer definition.

NetSpool End-of-File Section

The NetSpool End-of-File section contains attributes that tell NetSpool when to close the output data set on the JES spool so that the data can be printed. "ISPF Panel for NetSpool End-of-File Section or Component" on page 378 shows the panels that you use to specify attributes in the NetSpool End-of-File section of a printer definition.

IP PrintWay Options Section

The IP PrintWay Options section contains attributes that tell IP PrintWay how long to retain data sets on the JES spool after transmission to the remote system, how often to retry unsuccessful transmissions, which exits to call while processing data, and so on. "ISPF Panel for IP PrintWay Options Section or Component" on page 379 shows the panel that you use to specify attributes in the IP PrintWay Options section of a printer definition.

Protocol Section

The Protocol section contains attributes that tell IP PrintWay which transmission protocol to use to transmit data sets to the remote system: line printer requester (LPR), direct-sockets printing, Internet Printing Protocol (IPP), VTAM, or e-mail. This section also contains attributes that are specific to the type of transmission protocol you select. For example, in this section you can specify LPR options such as whether you want the LPD on the remote system to print a banner page.

"ISPF Panels for Protocol Section or Component" on page 380 shows the panels that you use to specify attributes in the Protocol section of a printer definition.

Including Components in Printer Definitions

Because a Printer Inventory might contain hundreds or thousands of printer definitions, changing information in many printer definitions can be time-consuming. Therefore, you might want to create additional objects in the Printer Inventory called components and include them in printer definitions. Consider creating components when several printer definitions share the same attributes. To use components:

1. Specify the shared attributes in a component, instead of specifying the same attributes in many printer definitions.
2. Include the component in all printer definitions to which those attributes apply.

When you change the attributes in a component, all printer definitions that include that component pick up the new attributes.

Creating components is optional. Some printer definitions in the Printer Inventory might include components, while other printer definitions might not. Whether or not you use components, you can use the Printer Inventory Definition Utility (PIDU) to make changes to many printer definitions at one time; see Chapter 17, "Using the PIDU Program to Manage the Printer Inventory" on page 233 for information about PIDU.

When you create components, you do not need to specify every attribute in that component. Instead, you might want to specify some attributes in the printer definitions. For example, the Protocol component contains an attribute that defines the IP address of the remote printer. Because the IP address is usually unique for each remote printer, you could omit the IP address from the component and instead specify it in the printer definition.

When you include components in a printer definition, you can override some of the attributes specified in the components by specifying a different value in the printer definition itself. For example, if one printer definition requires a longer retention time on the JES spool, you can override the attribute that specifies the retention time in the printer definition itself; you do not need to create a new component. Notice, however, that if you override an attribute in a printer definition, when you change the same attribute in the component, the printer definition does *not* pick up the new attribute.

You can create six different types of components, one type for each section of a printer definition: Allocation, Processing, NetSpool Options, NetSpool End-of-File, IP PrintWay Options, and Protocol components.

Example of Components for IP PrintWay Printer Definitions

Figure 11 shows an example of components that you can include in IP PrintWay printer definitions. After the figure is a description of the components.
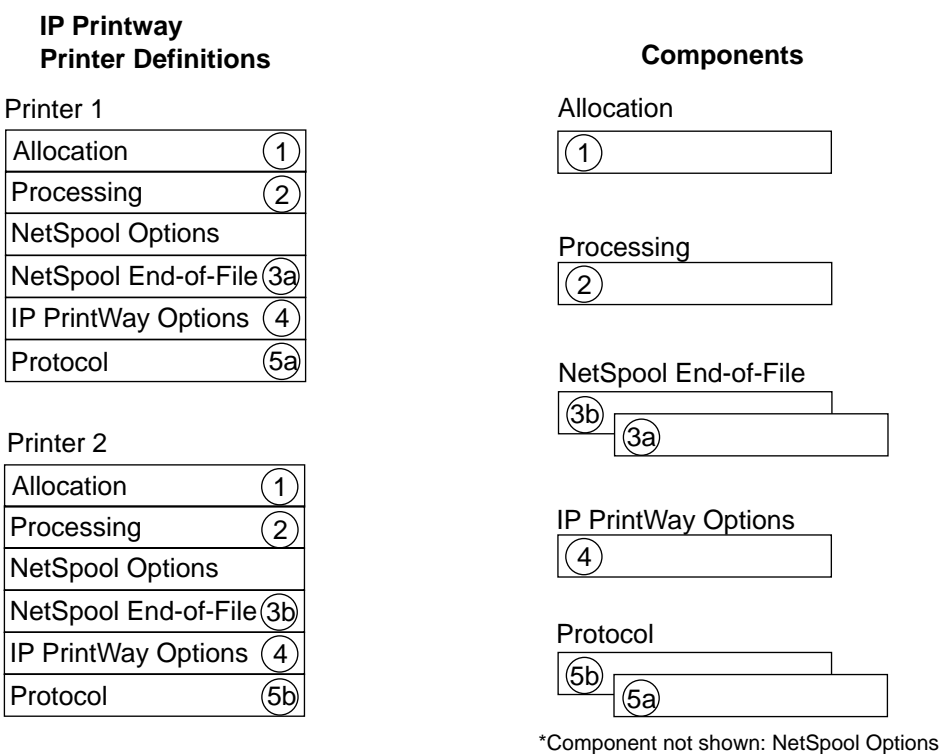
Figure 11. Components for an IP PrintWay Printer Definition

1. **Allocation Component:** Both IP PrintWay printer definitions shown include the same Allocation component. In this component, you could specify the work-selection criteria that the system programmer has defined to JES for the IP PrintWay FSA. For example, if the IP PrintWay FSA selects jobs in output class P, then specify class P in this component.

You might need to specify some allocation attributes in the printer definitions themselves. For example, if job submitters need to select these printer definitions using the CLASS, DEST, or FORMS parameters on an OUTPUT JCL statement, then the value for the DEST or FORMS attribute must be unique for each printer definition. Because this value is unique, do not specify it in the component; instead, specify the DEST or FORMS value in the printer definition itself. See "Using DEST, CLASS, and FORMS to Select a Printer Definition" on page 167 for more information.

2. **Processing Component:** Both IP PrintWay printer definitions include the same Processing component. In this component, you could specify the data formats that the target print queues can accept, for example, line data, text data, and PCL data. You could also specify whether or not you want the target LPD to print a page header.

3. **NetSpool End-of-File Components:** Each IP PrintWay printer definition includes a different NetSpool End-of-File component. In these components, you could specify different end-of-file rules for NetSpool to use.

   Only printer definitions that are configured for use with NetSpool need to include a NetSpool End-of-File component; however, you can include a NetSpool End-of-File component even if NetSpool is not configured.

4. **IP PrintWay Options Component:** Both IP PrintWay printer definitions include the same IP PrintWay Options component. In this component, you could specify a retry time and a retention time for unsuccessfully transmitted data sets. You could also specify the name of an IP PrintWay exit program.

5. **Protocol Components:** Each IP PrintWay printer definition includes a different Protocol component. In the first Protocol component, you could specify attributes for the LPR protocol, while in the second Protocol component, you could specify attributes for the VTAM protocol.

   Because the IP address (for the LPR and direct sockets protocols), the URL (for the IPP protocol), the logical unit name (for the VTAM protocol), and the e-mail addresses are typically unique, do not specify these values in the component; instead, specify the IP address, URL, logical unit name, and e-mail addresses in each printer definition that includes the component.

Note: Neither printer definition in this example includes a NetSpool Options component.

Example of Components for PSF for OS/390 Printer Definitions

Figure 12 on page 88 shows an example of components you can include in PSF for OS/390 printer definitions. After the figure is a description of each component and printer definition.

You can include the same components in different types of printer definitions. For example, IP PrintWay and PSF for OS/390 printer definitions can share the NetSpool End-of-File components, if the same NetSpool end-of-file rule is appropriate.

**PSF for OS/390
Printer Definitions**   **Components**

Printer 3   Processing

Allocation
Processing (1)
NetSpool Options
NetSpool End-of-File (2a)

(1)

NetSpool End-of-File

(2b)
(2a)

Printer 4

Allocation
Processing (1)
NetSpool Options
NetSpool End-of-File (2b)
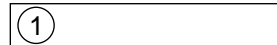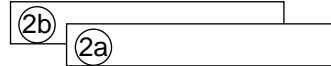
*Components not shown: Allocation
and NetSpool Options

Figure 12. Components for a PSF for OS/390 Printer Definition

1. **Processing Component:** Both PSF for OS/390 printer definitions include the same Processing component. In this component, you could specify the data formats that the PSF for OS/390 printers support and the data transforms that you want to use.

2. **NetSpool End-of-File Component:** Each PSF for OS/390 printer definition includes a different NetSpool End-of-File component. In these components, you might specify different end-of-file rules for NetSpool to use.

   Only printer definitions that are configured for use with NetSpool need to include a NetSpool End-of-File component; however, you can include a NetSpool End-of-File component even if NetSpool is not configured.

Notes:

1. Neither printer definition in this example includes an Allocation component because each PSF for OS/390 printer FSA in this example has unique work-selection criteria, which means that Print Interface and NetSpool must allocate data sets on the JES spool with different allocation values. Therefore, the allocation values are specified in the printer definitions themselves.

2. Neither printer definition in this example includes a NetSpool Options component.

Planning Printer Pool Definitions

Printer pool definitions let you broadcast data to more than one printer at a time. Each printer pool definition defines the group of printer definitions to which you want to broadcast data.

Only NetSpool supports broadcasting; therefore, only VTAM applications can print to a printer pool definition. NetSpool uses the attributes specified in the Allocation section of each printer definition to create output data sets on the JES spool, one output data set for each printer definition.

Figure 13 on page 89 shows the relationship between a printer pool definition and printer definitions.

Printer Pool Definition
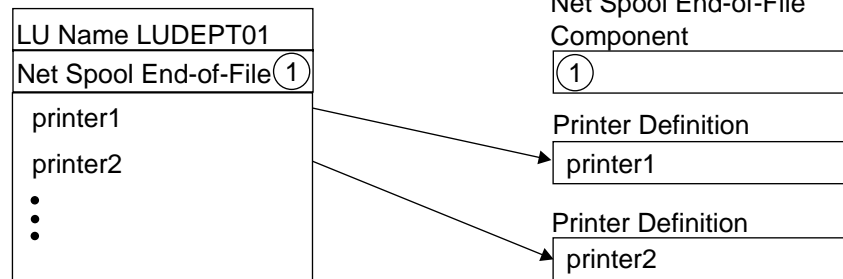
Figure 13. Relationship Between Printer Pool Definition and Printer Definitions

The printer pool definition specifies the NetSpool printer LU name (LUDEPT01 in this example) and lists the printer definitions in the broadcast group (Printer 1 and Printer 2). The printer definitions are standard printer definitions; that is, they could be used for printing directly from clients, including VTAM applications.

"ISPF Panel for a Printer Pool Definition" on page 383 shows the panel that you use to specify attributes in a Printer Pool definition. See "Broadcasting Data Using Multiple Printer Definitions" on page 142 for more information about how to create a printer pool definition.

Planning FSS Definitions

An FSS definition contains information about a JES functional subsystem (FSS). You can define two types of FSS definitions:

- IP PrintWay FSS definitions. IP PrintWay can use the information in this definition when the IP PrintWay FSS starts.
- PSF for OS/390 FSS definitions. PSF for OS/390 can use the information in this definition when a PSF for OS/390 FSS starts.

You can use the Infoprint Server ISPF panels to create and manage FSS definitions. "ISPF Panel for IP PrintWay FSS Definition" on page 384 shows the panel that you use to create an FSS definition; also see "Managing FSS Definitions" on page 228 for information about how to use the ISPF panels. You can also use the Printer Inventory Definition Utility (PIDU) to create FSS definitions; see Chapter 17, "Using the PIDU Program to Manage the Printer Inventory" on page 233 for information.

Note: You must also define each IP PrintWay and PSF FSS to JES. The FSS definition in the Printer Inventory does *not* replace the JES definition.

IP PrintWay FSS Definitions

In an IP PrintWay FSS definition you can specify configuration information that applies to all functional subsystem applications (FSAs) in the IP PrintWay FSS. You can define one IP PrintWay FSS definition for each FSS that your installation has defined to JES.

In the FSS definition you can specify the following information:

- The name of the TCP/IP startup procedure.
- The language IP PrintWay uses for messages.
- The type of tracing to start for each FSA and the size of tracing tables
- The number of hiperspace blocks each FSA can use

- Whether IP PrintWay is to use the standard TCP/IP translation table to convert data from EBCDIC to ASCII
- The default document code page that IP PrintWay uses when it converts data from an EBCDIC code page to the printer's code page
- The VTAM ID of the application program that IP PrintWay uses to transmit data to a VTAM-controlled printer

Creating IP PrintWay FSS definitions is optional unless your installation plans to print to VTAM-controlled printers. If your installation plans to print to VTAM-controlled printers, you must specify the ID of the application program you defined to VTAM for IP PrintWay. If an IP PrintWay FSS definition is not created when IP PrintWay starts, IP PrintWay uses default values for the other attributes you can specify in an FSS definition.

If you create an FSS definition after the FSS has started or if you change any information in the FSS definition, you must restart the IP PrintWay FSS to pick up the changes.

Note: *z/OS Infoprint Server Customization* and the ISPF help panels contain more information about the values you can specify in an IP PrintWay FSS definition.

PSF for OS/390 FSS Definitions

In a PSF for OS/390 FSS definition you can specify configuration information that applies to all PSF functional subsystem applications (FSAs) in the PSF FSS. You can create one FSS definition for each FSS that your installation has defined to JES.

If you want PSF to use configuration information specified in an FSS definition, PSF must be customized to use the Printer Inventory. If PSF uses the Printer Inventory, then an FSS definition must exist in the Printer Inventory. PSF must use the Printer Inventory if you want to display printer status for any PSF printers using function provided by the Infoprint Server SNMP subagent.

If you create an FSS definition after the PSF FSS is started or if you change any information in the FSS definition, you must restart the PSF FSS to pick up the changes.

Note: *PSF for OS/390 & z/OS: Customization* contains complete information about the fields and values you can specify in a PSF for OS/390 FSS definition, including sample ISPF panels. *PSF for OS/390 & z/OS: Customization* also tells you how to customize PSF to use the Printer Inventory and how to use a migration program to create PSF for OS/390 FSS definitions.

Planning FSA Definitions

An FSA definition contains information about functional subsystem applications (FSAs) defined to JES. You can define two types of FSA definitions:
- IP PrintWay FSA definition. IP PrintWay uses the information in this definition when the FSA starts.
- PSF for OS/390 FSA definition. PSF for OS/390 uses the information in this definition when the FSA starts.

You can use the Infoprint Server ISPF panels to create and manage FSA
definitions. "ISPF Panel for IP PrintWay FSA Definition" on page 384 shows the
panel that you use to create an FSS definition; also see "Managing FSA Definitions"
on page 230 for information about how to use the ISPF panels. You can also use
the Printer Inventory Definition Utility (PIDU) to create FSS definitions; see
Chapter 17, "Using the PIDU Program to Manage the Printer Inventory" on
page 233 for information.

Note: You must also define each IP PrintWay and PSF FSA to JES. The FSA
definition in the Printer Inventory does *not* replace the JES definition.

IP PrintWay FSA Definitions

You can create one IP PrintWay FSA definition for each IP PrintWay FSA that your
installation has defined to JES. In each IP PrintWay FSA definition you can specify
the type of tracing to start for the FSA.

Creating IP PrintWay FSA definitions is optional. If an IP PrintWay FSA definition
has not been created for an FSA, IP PrintWay uses the tracing value specified in
the FSS definition.

If you create an FSA definition after the FSA is started or if you change the FSA
definition, you must restart the IP PrintWay FSA to use the changed values;
however, you do not need to restart the FSS and any other IP PrintWay FSA.

Note: *z/OS Infoprint Server Customization* and the ISPF help panels contain
information about values you can specify in an IP PrintWay FSA definition.

PSF for OS/390 FSA Definitions

You can create one PSF for OS/390 FSA definition for each PSF FSA that your
installation has defined to JES. In each PSF for OS/390 FSA definition you can
specify configuration information that applies to that FSA. In the FSA definition, you
can specify that you want PSF to provide printer information to the Infoprint Server
SNMP subagent.

If you want PSF to use configuration information specified in FSA definitions, then
PSF must be customized to use the Printer Inventory. If PSF uses the Printer
Inventory, then an FSA definition must exist in the Printer Inventory for each PSF
FSA within the FSS.

If you create an FSA definition after the PSF FSA is started or if you change any
information in the FSA definition, you must restart the PSF FSA to pick up the
changes; however, you do not need to restart the PSF FSS.

Note: *PSF for OS/390 & z/OS: Customization* contains complete information about
the values you can specify in a PSF for OS/390 FSA definition, including
sample ISPF panels. *PSF for OS/390 & z/OS: Customization* also tells you
how to customize PSF to use the Printer Inventory and how to use a
migration program to create PSF for OS/390 FSA definitions.

Chapter 11. Planning Printer Definitions for Print Interface

Before using Print Interface to allocate output data sets on the JES spool, you must specify the attributes that Print Interface uses in the printer definitions for the target printers. If a printer definition does not already exist for the target printer, you must create one; if a printer definition already exists for the target printer, simply edit it and specify the attributes that Print Interface uses.

Once you have specified the attributes that Print Interface uses, users can use one of several different methods to submit print jobs to Print Interface; for example, the **lp** command, the AOPPRINT JCL procedure, an **lpr** command, the Server Message Block (SMB) protocol from a Windows system, the Infoprint Port Monitor for Windows, or the Print Interface subsystem. The attributes you specify in a printer definition are the same regardless of the method users might use to submit print jobs.

Table 33 on page 366 summarizes the attributes that Print Interface uses and indicates whether each attribute is required or optional. You can use the Infoprint Server ISPF panels or the Printer Inventory Definition Utility (PIDU) to specify these attributes.

This chapter describes how to specify printer attributes to accomplish the following tasks:

Task	See Page:
Specifying JES Allocation Parameters	93
Validating That Documents Can Print as Requested	96
Using the aopfiltr.so Filter	98
Using the LPD Compatibility Filter	99
Using an Installation-Provided Filter	103
Transforming Data Remotely with Infoprint Manager for AIX or Windows NT/2000	104
Converting Data from EBCDIC to ASCII or ASCII to EBCDIC	110
Mapping Output Bin and Input Tray Names to Numbers for an IBM AFP Printer	111
Using the Print Interface Subsystem	112
Creating the Infoprint Server Default Printer Definition	118

Note: This chapter contains planning information only. For detailed information about each attribute (including the values you can specify, restrictions, and examples), use the online help for each field on the ISPF panels.

Specifying JES Allocation Parameters

You can specify attributes in the Allocation section of the printer definition to tell Print Interface how to allocate output data sets on the JES spool. For example, you can specify the JES output class, destination name, and so on. Many job submission methods do not let the user specify allocation parameters; therefore, you must specify the required parameters, such as the JES output class, in the printer definition.

Each attribute in the Allocation section of a printer definition corresponds to a parameter on a DD or OUTPUT JCL statement. "Allocation Attributes and Corresponding OUTPUT or DD Statement Parameters" on page 363 lists fields in the Allocation section and the corresponding JCL parameters. Refer to the *z/OS MVS JCL Reference* for an full explanation of each JCL parameter. The ISPF online help for each field summarizes the meaning of each field.

Some allocation attributes apply only if the target printer is a PSF printer or if the printer definition is configured to use the AFP to PCL, AFP to PDF, or AFP to PostScript transforms. The ISPF online help for each field identifies which fields are used by PSF and the transforms. Also see "Transforming AFP Data and Line Data to PCL, PDF, and PostScript Format" on page 205 for a list of the fields that apply when you use the transforms.

When the Print Interface subsystem is used, job attributes specified in the SUBSYS parameter of the DD JCL statement, and parameters specified on the DD and OUTPUT JCL statements, override the values specified in the Allocation section of the printer definition.

NetSpool also uses the same attributes in the Allocation section to allocate data sets on the JES spool. In most cases, the same attributes are suitable for both NetSpool and Print Interface; however, if you need to specify unique attributes for Print Interface or NetSpool, create two separate printer definitions for the printer, one for users to submit print requests to Print Interface and another for users to submit print requests to NetSpool.

Procedure for Specifying Attributes

On the Allocation panel, specify:
- **Spool allocation values** heading: The fields under this heading correspond to the OUTPUT JCL parameters that JES can use to direct output data sets from the JES spool to IP PrintWay, a PSF printer, or another JES functional subsystem application (FSA). In these fields, specify the appropriate JES work-selection parameters for the target printer:
  - In an IP PrintWay printer definition, specify the JES work-selection criteria for the IP PrintWay FSA. For example, if the JES work-selection criterion is class P, specify **P** in the **CLASS** field.
  - In a PSF for OS/390 printer definition, specify the JES work-selection criteria for the PSF printer FSA. For example, if the JES work-selection criteria are class E and destination BLDG5, specify **E** in the **CLASS** field and **BLDG5** in the **DEST** field.

  JES work-selection criteria are defined in the JES3 DEVICE statement and the JES2 PRT*nnnnn* statement.
- Specify other fields that the AFP to PCL, AFP to PDF, or AFP to PostScript transforms, PSF, IP PrintWay, and JES use:
  - If your installation uses the transforms, specify fields that the transforms use. See "Transforming AFP Data and Line Data to PCL, PDF, and PostScript Format" on page 205 for information about these fields.
  - In an IP PrintWay printer definition, specify fields that IP PrintWay uses. See "Specifying Attributes for Allocation" on page 166 for information about these fields.
  - In a PSF for OS/390 printer definition, specify fields that correspond to the JCL parameters that PSF uses. Refer to *PSF for OS/390 & z/OS: User's Guide* for information about these JCL parameters.

Tip: If you need to specify the same allocation attributes in more than one printer definition, specify the attributes in an Allocation component. Then, include that component in each printer definition to which the component applies.

Example
The following ISPF panel shows how to specify an output class and destination in the Allocation section of a PSF for OS/390 printer definition.

```
                              Allocation

Spool allocation values:
    CLASS . . . . . E              LINECT. . . ___
    DEST. . . . . BLDG5___         PRMODE. . . _____
    JES node. . . _____         PRTY. . . . __
    FCB . . . . . ___              SEGMENT . . _____
    FLASH count . ___              THRESHLD. . _____
    FLASH name. . ____             UCS . . . . ___
    FORMS . . . . _____         WRITER. . . _____
    GROUPID . . . _____
    USERDATA
      . . _____ (extend)
    BURST . . . . _  1. Yes  2. No
    HOLD. . . . . _  1. Yes  2. No
    OUTDISP . . . _  1. Purge  2. Leave  3. Keep  4. Hold  5. Write
Values for Separator Pages:
    Address
      . . _____(extend)
    Building . . _____
    Department . _____
    Name . . . . _____
    Room . . . . _____
    Title  . . . _____
Resource Related Values:
    Form definition . _____
    Character sets  . ___   ____   ____   ____
    Overlay front . . _____     Back . . _____
    Input tray  . . . ___
    Output bin  . . . ____
    Page definition . _____
    Resource library. _____ (extend)
    Image shift x-direction front . . _____     Back . . _____
                y-direction front . . _____     Back . . _____
Error Reporting Values:
    Print error reporting. . _  1. None  2. All  3. Character  4. Position
    Error disposition. . . . _  1. Default  2. Hold  3. Quit
    _ Print error messages
        Maximum messages. .___
Other Values:
    Notify . . . . . . . _____     at node . . _____
                         _____     at node . . _____
                         _____     at node . . _____
                         _____     at node . . _____
    Checkpoint pages . . ____
    Checkpoint seconds . ____
    Copies . . . . . . . ____
    Copy group . . . . . ___  ___  ___  ___  ___  ___  ___  ___
    Color map. . . . . . _____
    Com setup member . . _____
    JES form length. . . _____
    Resolution . . . . . ___
    Duplex. . . . . . . _  1. Simplex  2. Duplex  3. Tumble
    Label data pages . . _  1. Yes  2. No
    Restrict printable area . . _  1. Yes  2. No
    _ Table reference characters
```

Result: Print Interface allocates output data sets in JES output class E and with destination name BLDG5. The PSF printer (FSA) defined to JES with work-selection criteria of class E and destination BLDG5 selects the output data set for printing.

Validating That Documents Can Print as Requested

Before accepting a print request, Print Interface can validate that the document can print as requested on the target printer. For example, Print Interface can verify that the target printer supports the data format of the input document. If Print Interface determines that a document cannot print, Print Interface rejects the print request with a message and does not allocate a data set on the JES spool.

Table 5 lists the fields in a printer definition that Print Interface uses to validate that the print request can print on the selected printer. The third column in the table indicates the job attribute or JCL parameter that the job submitter specifies to request a print function.

Table 5. Printer Definition Fields Used for Validation

Field Name	Meaning	Job Attribute and JCL Parameter
Data format	Input data formats the printer supports. See "Data Formats" for more information.	**document-format** job attribute
Duplexes supported	Duplexing supported by the printer (simplex, duplex, and tumble)	**duplex** job attribute DUPLEX JCL parameter
Forms supported	Forms names allowed	**forms** job attribute FORMS JCL parameter
Maximum copies	Maximum number of copies allowed	**copies** job attribute COPIES JCL parameter
Maximum document size	Maximum size of document (in bytes) allowed. This number includes copies and all files submitted with one **lp** command.	None. Print Interface determines the document size.
Print-error reporting supported	Types of error-reporting supported by the printer (invalid-character and print-positioning errors)	**print-error-reporting** job attribute DATACK JCL parameter

Notes:

1. Print Interface does not inspect options specified in the form definition used to print the job during validation. For example, if the form definition specifies five copies, Print Interface does not use this copy count to determine whether the print request exceeds the copy limit or size limit.
2. Print Interface validates the JCL parameters if (1) the Print Interface subsystem is used or (2) the IP PrintWay resubmit for filtering function is used.

Data Formats

In the **Data format** field, select all input data formats that the printer supports. Also select all input data formats that can be transformed into a supported data format by the associated filter.

Print Interface automatically determines the type of data format in each input document unless the job submitter specifies the data format in the **document-format** job attribute. If Print Interface cannot determine the input data format, the data format defaults to **other**.

Recommendations:

1. In a PSF for OS/390 printer definition, select **line data**, **text**, and **MO:DCA-P**. PSF for OS/390 accepts line data and MO:DCA-P formats. Print Interface automatically transforms text data into line data when the printer definition is a PSF for OS/390 printer definition.

   If your installation has installed Infoprint Server Transforms, you can select additional data formats. For example, you can select the PostScript data format and specify the **ps2afp.dll** as an associated filter. See Chapter 14, "Planning Printer Definitions for Infoprint Server Transforms" on page 201 for information.

2. In an IP PrintWay printer definition, select the data formats accepted by the printer.

   If the printer accepts text data, select **line data** as well as **text** because Print Interface automatically converts line data to text data.

   If your installation has installed the AFP to PCL, AFP to PDF, or AFP to PostScript transform, also select any data format that can be transformed into an accepted data format. For example, if you installed the AFP to PCL transform, select **MO:DCA-P** and **line data** and specify the **afp2pcl.dll** as an associated filter for both data formats. See Chapter 14, "Planning Printer Definitions for Infoprint Server Transforms" on page 201 for more information.

3. Select **other** as one of the supported data formats *only* if you want Print Interface to send documents with an unknown data format to the printer. By default, the **other** data format is selected, so be sure to deselect it unless the printer can accept data formats other than those Print Interface can automatically detect.

Table 6 explains the types of input data formats that you can select. You can select more than one type of data format.

Table 6. Data Formats

Data Format	Meaning
Line data	Character data that can contain carriage-control characters and table-reference characters. This type of data is typically found in mainframe data sets and is usually EBCDIC data.
Text	Character data that can contain control characters LF (or NL), CR, HT, VT, and FF. This type of data is typically found in workstation files and is often ASCII data.
MO:DCA-P	The Mixed Object Document Content Architecture defined by IBM. Line-data records can be mixed with the MO:DCA-P data. **Note:** This data format is also called Advanced Function Presentation (AFP) format.
PCL	The Printer Control Language data format defined by Hewlett Packard.
PostScript	The PostScript data format defined by Adobe.
PDF	The Portable Document Format defined by Adobe.
SAP	The SAP Output text format (OTF) or ABAP format defined by SAP.
Other	All data formats that do not fall into one of the above categories. This is the default data format when Print Interface cannot determine the data format.

Procedure for Specifying Attributes

On the Processing panel, specify the fields listed in Table 5 on page 96.

Note: When you leave the default settings on the Processing panel, Print Interface does not validate print requests.

Example

The following ISPF panel shows how to specify the valid data formats, duplexing options, and print-error reporting options. Only a portion of the panel is shown.

```
                              Processing
:

Print Interface Supported Data Formats and Associated Filters:
Data format:  Filter:

/ Line data    _____   (extend)
/ MO:DCA-P     _____   (extend)
_ PostScript   _____   (extend)
/ Text         _____   (extend)
_ PCL          _____   (extend)
_ PDF          _____   (extend)
_ SAP          _____   (extend)
_ Other        _____   (extend)

_ Resubmit for filtering

:

Maximum document size . _____
Maximum copies. . . . . _____
Forms supported . . . . _____  _____  _____  _____   (more)
Duplex supported. . . . / Simplex  _  Duplex   _ Tumble
Print-error reporting supported . / Character  / Position
:
```

Result: Print Interface rejects any print request that contains the following data formats or print options:

- A data format of PostScript, PCL, PDF, or SAP, or an unknown data format.

- The **duplex=yes** or **duplex=tumble** job attribute.

- The DUPLEX=NORMAL or DUPLEX=TUMBLE parameter on the OUTPUT JCL statement.

Using the aopfiltr.so Filter

For each type of data format that Print Interface supports (line-data, text, MO:DCA-P, PCL, and so on), you can specify the name of an associated filter. A filter is a program that can inspect and modify data before Print Interface writes the data to an output data set on the JES spool. When you specify the name of an filter for a supported data format in a printer definition, Print Interface automatically calls that filter before writing data to the JES spool.

Infoprint Server provides filter **aopfiltr.so**, which prepares text data for printing on ASCII printers. This filter converts ASCII line-feed controls that are not preceded by carriage-return controls to carriage-return and line-feed controls (X'0D0A'). The X'0D0A' control is suitable for most ASCII printers.

Recommendations:

- Specify filter **aopfiltr.so** for the **text** data format in all IP PrintWay printer definitions *except* when you select the VTAM protocol or the e-mail protocol.

- Do *not* specify filter **aopfiltr.so** in a PSF for OS/390 printer definition.

Procedure for Specifying Attributes

On the Processing panel of an IP PrintWay printer definition, specify:

- **Data format** field: Select the **Text** data format.
- **Filter** field: Specify the name of the **aopfiltr.so** filter. Type the absolute pathame if the filter is *not* in a directory named in the LIBPATH environment variable.
- **Resubmit for filtering** field: Do *not* select this field if the only filter you specify in the printer definition is **aopfiltr.so**. See "Resubmitting Documents to Print Interface for Filtering" on page 191 for more information about this field. Selecting this field can adversely impact system performance.

Note: When you use the Infoprint Server ISPF panels to create an IP PrintWay printer definition, filter **aopfiltr.so** is automatically displayed in the **Filter** field on the Processing panel of an IP PrintWay printer definition when you select the LPR, direct sockets, IPP, or e-mail protocol.

Example

The following ISPF panel shows how to specify the **aopfiltr.so** filter provided by Infoprint Server in the Processing section of an IP PrintWay printer definition. Only a portion of the ISPF panel is shown.

```
                             Processing
 :

Print Interface Supported Data Formats and Associated Filters:

Data format:  Filter:

_  Line data   _____  (extend)
_  MO:DCA-P    _____  (extend)
_  PostScript  _____  (extend)
/  Text        aopfiltr.so_____  (extend)
_  PCL         _____  (extend)
_  PDF         _____  (extend)
_  SAP         _____  (extend)
_  Other       _____  (extend)

_  Resubmit for filtering
 :
```

Using the LPD Compatibility Filter

For each type of data format that Print Interface supports (line data, MO:DCA-P, PostScript, text, PCL, PDF, SAP, and other), you can specify the name of an associated filter. A filter is a program that can modify data before Print Interface writes the data to an output data set on the JES spool. When you specify the name of a filter for a supported data format in a printer definition, Print Interface automatically calls that filter before writing data to the JES spool.

Infoprint Server provides the LPD compatibility filter, **lpd_compat.so**, which formats text data and line data in a similar way to the z/OS TCP/IP LPD and creates line data. This filter is suitable for use with the **line data**, **text**, and **other** data formats for printers that accept line data.

The LPD compatibility filter, **lpd_compat.so**, provides support for some LPD command codes and parameters that the Print Interface LPD does not otherwise support. (LPD command codes and parameters are specified in the LPD control file

sent by the LPR with each document to be printed.) This filter also lets you specify the **-f**, **-l**, and **-w** filter options, which correspond to the FILTER, LINECOUNT, and WIDTH parameters of the TCP/IP LPR command.

Table 7 summarizes the LPD command codes supported by the Print Interface LPD, with and without the LPD compatibility filter. See RFC 1179 for a full description of the LPD command codes.

Table 7. LPD Command Codes Supported by Print Interface LPD

Command Code	Description	Supported by Print Interface LPD	
		Without Compatibility Filter	**With Compatibility Filter**
C	Class	No	No
H	Host name; this value becomes the address in the Infoprint Server **address-text** job attribute.	Yes	Yes
I	Indent printing	No	No
J	Job name; this value becomes the title in the Infoprint Server **title-text** job attribute if the T command code does not exist.[2]	Yes	Yes
	Job name parameters [1]	No	No
L	Print banner page	No	No
M	Mail when printed; this value activates notification.	Yes	Yes
N	Name of source file; this value becomes the filename displayed by the **lpq** or **lpstat** command. The compatibility filter also uses this name as the title if the T command code does not exist and the **p** command code is specified.	Yes	Yes
P	Owner. Print Interface allocates data sets on the JES spool with this value in the job name field. [2]	Yes	Yes
T	Title; this value becomes the title in the Infoprint Server **title-text** attribute.	Yes	Yes
W	Width of output	No	Yes
X	Infoprint Server job attributes. If attributes are prefixed with AOP, the LPD validates that the job attributes are supported by the target printer.	Yes	No
1, 2, 3, 4	File names for troff fonts.	No	No
c	Plot CIF file	Yes [3]	Yes [3]
d	Print DVI file	Yes [3]	Yes [3]
f	Print formatted file	Yes [3] [4]	Yes
g	Plot file	Yes [3]	Yes [3]
l	Print file leaving control characters	Yes [4]	Yes
n	Print ditroff output file	Yes [3]	Yes [3]

Table 7. LPD Command Codes Supported by Print Interface LPD (continued)

Command Code	Description	Supported by Print Interface LPD	
		Without Compatibility Filter	**With Compatibility Filter**
o	Print PostScript output file	Yes[3]	Yes [3]
p	Print a header and page numbers on each page	No	Yes
r	Print with FORTRAN (ANSI) carriage controls	Yes	Yes
t	Print troff output file	Yes [3]	Yes [3]
v	Print raster file	Yes [3]	Yes [3]

1. The z/OS TCP/IP LPR command lets you specify the following parameters as part of the job name: DEST, FOR, FORM, IDENTIFIER, LINECOUNT, OTHER, PASS, and PRIORITY. Print Interface does not support these parameters.

2. JES does not permit the Print Interface LPD to allocate data sets on the JES spool with the owner's name; therefore, in order to make the owner name visible on the JES spool, the Print Interface LPD makes the owner name the job name *except* when IP PrintWay submits the data set to the Print Interface LPD. In this case, the Print Interface LPD keeps the original job name so that the operator can use the original job name to find the data set on the spool.

3. Print Interface automatically detects the data format of the input data stream and ignores the format specification in the command code. For example, Print Interface detects a PostScript data stream even if the **o** command code is not specified.

4. Without the compatibility filter, command codes **f** and **l** are equivalent. Print Interface leaves all ASCII control characters in the output data stream.

5. If an unsupported command code is specified in the LPD control file, the command code is ignored and no error is reported.

6. The Print Interface LPD, with or without the compatibility filter, does *not* support the following functions that you can specify with the z/OS TCP/IP LPR command:

   • Carriage control specification

   • Top margin

7. The Print Interface LPD, with or without the compatibility filter, can print multiple copies of the same file when the LPD control file contains multiple lower case command codes followed by the name of the same print file. (The Print Interface LPD always prints at least one copy of a file, even if no lower case command code is specified in the LPD control file.)

Recommendations:

• If you want the functions provided by filter **lpd_compat.so**, specify it for the **Text**, **Line data**, and **Other** data formats in PSF for OS/390 printer definitions, General printer definitions, and in IP PrintWay printer definitions when you select the VTAM protocol.

• Do *not* specify filter **lpd_compat.so** in an IP PrintWay printer definition, *except* when you select the VTAM protocol.

Filter Options

When you specify the **lpd_compat.so** filter, you can also optionally specify a filter code, a maximum line count, and a maximum line width in the printer definition. You specify these values in filter options. Job submitters can specify the same filter options in the Infoprint Server **filter-options** job attribute.

The **lpd_compat.so** filter accepts the following options:

%filter-options

Causes options specified in the **filter-options** job attribute (specified, for example, on the **lp** command) to be passed to the transform.

You can type the **%filter-options** option in any position relative to the other filter options. If you specify filter options to the right of **%filter-options**, those options override the same options specified in the **filter-options** job attribute.

-f *filter* Specifies the type of filter processing. This option is used only if the **f**, **l**, **p**, and **r** command codes are not specified in the LPD control file. The default value is **f**. Valid values are:

Filter	Meaning
f	Paginate the data, but do not add a heading. Truncate lines that exceed the maximum width. Discard any ASCII control characters except CR, FF, LF, BS, NL, VT, and HT.
l	Do not paginate the data or add a heading. Pass through all control characters.
p	Paginate the data, adding a heading to each page. The heading includes the date and time that Infoprint Server received the data, the title, and the page number. The title is the name of file as specified by the N (name) command code in the LPD control file, unless the T (title) command code is specified. After a page of text, a new page is started with a new page number. Truncate lines that exceed the maximum width.
r	Interpret the first column of each input line as a FORTRAN (ANSI) carriage control. Blank, ″1″, ″0″, ″+″ and ″-″ carriage controls are supported. Truncate lines that exceed the maximum width.

The filter values correspond to the values allowed on the FILTER parameter of the z/OS TCP/IP LPR command.

-l *length*

Specifies the maximum number of lines to include on a page. This value applies only to filters **f** and **p**. The default value is 60 lines. To prevent Print Interface from inserting page breaks, specify 0.

This option corresponds to the LINECOUNT subparameter of the z/OS TCP/IP LPR command and also to the PAGESIZE parameter of the z/OS TCP/IP SERVICE statement.

-w *width*

Specifies the maximum number of columns to allow on a line. Lines longer than the number specified (except for the title line) are truncated. The number specified does not include the carriage control character at the beginning of each line. This value applies only to filters **f**, **p**, and **r**. It is used only if the W (width) command code is not specified in the LPD control file. The default action is that lines are not truncated.

This option corresponds to the WIDTH parameter of the TCP/IP LPR command and to the LINESIZE parameter of the TCP/IP SERVICE statement.

Procedure for Specifying Attributes

On the Processing panel of a printer definition, specify:

- **Data format** field: Select the data format to which the filter applies. For filter **lpd_compat.so**, select **Line data**, **Text**, and **Other**.

- **Filter** field: Specify **lpd_compat.so**. Type the absolute pathname if the filter is *not* in a directory named in the LIBPATH environment variable.

- **Resubmit for filtering** field: Do *not* select this field if the only filter you specify in the printer definition is **lpd_compat.so**. See "Resubmitting Documents to Print Interface for Filtering" on page 191 for more information about this field. Selecting this field can adversely impact system performance.

Example

The following ISPF panel shows how to specify the **lpd_compat.so** filter provided by Infoprint Server in the Processing section of a PSF for OS/390 printer definition. Only a portion of the ISPF panel is shown.

```
                            Processing

Printer definition name . myprinter_____
  :
  :

Print Interface Supported Data Formats and Associated Filters:
Data format:  Filter:

/ Line data  lpd_compat.so -w 72 %filter-options_____  (extend)
_ MO:DCA-P   _____  (extend)
_ PostScript _____  (extend)
/ Text       lpd_compat.so -w 72 %filter-options_____  (extend)
_ PCL        _____  (extend)
_ PDF        _____  (extend)
_ SAP        _____  (extend)
/ Other      lpd_compat.so -w 72 %filter-options_____  (extend)

_ Resubmit for filtering
  :
  :
```

The filter options have these meanings:

- The **%filter-options** option causes the filter to use any filter options that a job submitter specifies in the **filter-options** job attribute, for example on an **lp** command.

- The **-w** option causes the filter to truncate lines that exceed 72 printable characters.

  Because the **-w** option is specified to the *left* of **%filter-options**, a **-w** option specified in the **filter-options** job attribute overrides this value.

To print an MVS data set with a header on each page and a maximum width of 80 characters, a user could specify the **filter-options** job attribute on the following **lp** command:

```
lp -d myprinter -o "filter-options='-f p -w 80'" "//'MYDATA'"
```

Using an Installation-Provided Filter

For each type of data format that Print Interface supports (line-data, text, MO:DCA-P, PCL, and so on), you can specify the name of an associated filter. A filter is a program that can inspect and modify data before Print Interface writes the data to an output data set on the JES spool. When you specify the name of an filter

for a supported data format in a printer definition, Print Interface automatically calls that filter before writing data to the JES spool.

Your installation can write its own filter program, either a DLL filter or a UNIX filter. Refer to *z/OS Infoprint Server Customization* for information about how to write a filter.

Procedure for Specifying Attributes

On the Processing panel, specify:

- **Data format** field: Select the data format of the input document to which your filter applies.
- **Filter** field: Specify the name of the filter followed by any options that the filter accepts.
  - If the filter is a DLL filter, type the absolute pathname unless the filter is in a directory named in the LIBPATH environment variable.
  - If the filter is a UNIX filter, type **spawn** before the filter name. Type the absolute pathname of the filter unless the filter is in a directory named in the PATH environment variable.
- **Resubmit for filtering** field: See "Resubmitting Documents to Print Interface for Filtering" on page 191 for more information about this field. Selecting this field can adversely impact system performance.

Example

The following ISPF panel shows how to specify a UNIX filter written by your installation for text data. Only a portion of the ISPF panel is shown.

```
                              Processing
 :
 :
Print Interface Supported Data Formats and Associated Filters:
Data format:  Filter:

 _ Line data    _____  (extend)
 _ MO:DCA-P     _____  (extend)
 _ PostScript   _____  (extend)
 / Text         spawn /usr/mylib/my_unix_filter -a option operand  (extend)
 _ PCL          _____  (extend)
 _ PDF          _____  (extend)
 _ SAP          _____  (extend)
 _ Other        _____  (extend)

 _ Resubmit for filtering

 :
 :
```

If the input data stream contains text data, Print Interface calls the **my_unix_filter** filter to transform data. The options and operands that follow the filter name are passed to the filter.

Transforming Data Remotely with Infoprint Manager for AIX or Windows NT/2000

In most printing situations, you can transform data to AFP format on the z/OS system. To do this, install the Infoprint Server Transforms product, which is free to Infoprint Server customers, and follow the instructions in Chapter 14, "Planning Printer Definitions for Infoprint Server Transforms" on page 201.

In some situations, however, you might need to transform data to AFP format on a remote AIX or Windows system instead of on the local z/OS system. For example, you *must* transform color PostScript and PDF data to AFP format remotely in order to print on an IBM Infoprint Color 130 Plus printer. This is because the PDF to AFP and PostScript to AFP transforms on the z/OS system can only create monochrome AFP output. Only the PostScript to AFP and PDF to AFP transforms on the AIX system can create FS45 images which the Infoprint Color 130 Plus printer requires for color printing.

Print Interface lets you perform the following transforms remotely on an AIX or Windows NT/2000 system that has Infoprint Manager installed:
- PCL to AFP transform
- PDF to AFP transform
- PostScript to AFP transform

When you request transforms to be done remotely, using the **aoprform.dll** filter, Print Interface sends the PCL, PDF, or PostScript data to Infoprint Manager, and after the transform is completed, Infoprint Manager sends the data back to the z/OS system for printing.

Related Customization Tasks: For information about these tasks, refer to *IBM Infoprint Manager Administrator's Guide*, S544–5695:

- Install either Infoprint Manager for AIX Version 3 Release 2 or Infoprint Manager for Windows NT/2000 Version 1 Release 1 on the system where the remote transform is to be performed.
- To print to an IBM Infoprint Color 130 Plus printer, install Infoprint Manager for AIX Version 3 Release 2 with all service updates. Also, start the color rasterized image processor (RIP) on the AIX server.
- You do *not* need to order and install the Infoprint Server Transforms product.

Filter Options

To transform data remotely, use the **aoprform** filter. When you use this filter, you can specify the following filter options:

Filter **Filter Options**

aoprform.dll

> [%filter-options] [-a *imagetype*] [-l *length*] [-P *portnumber*]
> [-p *pagerange*] [-q *transformattributes*] [-r *resolution*]
> [-t *outputtype*] [-w *width*] [-x *xoffset*] [-y *yoffset*] *ipaddress*

where:

%filter-options
> Requests that the options specified in the **filter-options** job attribute be used. This option lets job submitters specify filter options, such as **–p** *pagerange* during job submission. If you omit this option, **aoprform** ignores options specified in the **filter-options** job attribute.
>
> You can type the **%filter-options** option in any position relative to the other filter options. If you specify filter options to the right of **%filter-options**, those options override the same options specified on the **lp** command, except for the **-p** *pagerange* option. If you specify the **-p** *pagerange* option, the pages specified in all occurrences of this option are selected for printing.

-a *imagetype*

The type of AFP data stream image that the transform generates for each page in the PCL, PostScript, or PDF file. Valid values are:

fs45
IOCA color FS45 images. Specify this value for an IBM Infoprint Color 130 Plus printer. Specify this value only for the **PostScript** and **PDF** data formats.

io1-g4
Compressed Image Object Content Architecture (IOCA) image in Modified Telecommunication Standardization Sector (TSS) T.6 G4 Facsimile Coding Scheme (G4 MMR) format. This is the recommended output type because it takes up less space on the hard disk, and it prints faster.

Notes:

1. Some older AFP printers do not support printing with an image type of **io1-g4**. For these printers, specify an image type of **io1-mmr** because it is the compressed image type supported by these printers. This image type results in faster printing than uncompressed image types.

2. TSS was formerly the International Telegraph and Telephone Consultative Committee (CCITT).

im1
IM1 image. This type of image is not compressed.

io1
IOCA image. This type of image is not compressed.

io1-mmr
Compressed IOCA image in Modified Modified Read (MMR) format.

-l *length*

This option is passed directly to the Infoprint Manager transform daemon. Refer to the **ps2afp** or **pcl2afp** command description in *IBM Infoprint Manager: Reference*, S544–5475, for the values you can specify.

-P
The TCP/IP port number on the AIX or Windows NT/2000 system at which the transform daemon is receiving data. Consult the AIX or Windows administrator for the correct value to specify. If you omit this option, the default port for the type of input data is used. Valid values are:

Value	Meaning
8251	The default port number for the **PostScript** and **PDF** data formats.
8253	The default port number for the **PCL** data format.
924 - *nnnnn*	Any valid port number greater than or equal to 924 at which the transform daemon is receiving data.

-p *pagerange*

This option is passed directly to the Infoprint Manager transform daemon. Refer to the **ps2afp** or **pcl2afp** command description in *IBM Infoprint Manager: Reference*, S544–5475, for the values you can specify.

-q *transformattributes*

When you select the FS45 image output (**–a fs45**), you can specify the following transform attributes and values. Refer to *IBM Infoprint Manager: Reference*, S544–5475, for a detailed description of these attributes and values:

color-profile={euroscale | <u>none</u> | swop}
Specifies the color profile that the transform is to use. The default value is **none**. You can also specify the following synonyms:

Value:	Synonym:
euroscale	**Euroscale**
swop	**SWOP**

color-rendering-intent={<u>relative</u> | perceptual}
Specifies how the transform is to process shades that the Infoprint Color 130 Plus cannot reproduce exactly. The default value is **relative**.

color-toner-saver={ <u>no</u> | yes}
Specifies whether the transform is to reduce the amount of color toner used by the printer. The default value is **no**. You can also specify the following synonyms:

Value:	Synonym:
no	**false**
yes	**true**

presentation-object-container-extraction-mode={<u>ignore</u> | inline}
Specifies how the transform generates presentation object container resources in the output stream. The default value is **ignore**.

-r *resolution*
This option is passed directly to the Infoprint Manager transform daemon. Refer to the **ps2afp** or **pcl2afp** command description in *IBM Infoprint Manager: Reference*, S544–5475, for the values you can specify.

-t *outputtype*
Determines the type of output to generate.

Valid values are:

<u>document</u>
Printable document. This is the default value.

overlay
Graphic image that can be printed on each page of a printable document.

pagesegment
Graphic image that can be embedded in a printable document.

> **Note:** When you generate overlays or page segments from multiple-page documents, the user might want to use the **-g** or **-p** option to select pages. Otherwise, one overlay or page segment is created for each page of the input file.

Rules:
- Specify attributes in the following format: *attribute=value*.
- If you specify more than one attribute, separate the attributes with spaces.
- Do *not* abbreviate the attribute names and values.
- Use the exact uppercase and lowercase letters for the attribute and values.
- If the **-q** value contains spaces, enclose the entire value in single or double quotation marks.

- You can specify the **-q** option multiple times. If you specify the same attribute multiple times, the last value specified for the attribute is used.

-w *width*

This option is passed directly to the Infoprint Manager transform daemon. Refer to the **ps2afp** or **pcl2afp** command description in *IBM Infoprint Manager: Reference*, S544–5475, for the values you can specify.

-x *xoffset*

This option is passed directly to the Infoprint Manager transform daemon. Refer to the **ps2afp** or **pcl2afp** command description in *IBM Infoprint Manager: Reference*, S544–5475, for the values you can specify.

-y *yoffset*

This option is passed directly to the Infoprint Manager transform daemon. Refer to the **ps2afp** or **pcl2afp** command description in *IBM Infoprint Manager: Reference*, S544–5475, for the values you can specify.

ipaddress

The host name or dotted-decimal address of the AIX or Windows NT/2000 system on which the transform daemon is running. This is a required option. For example, 9.99.9.23 or AIX4.

Procedure for Specifying Attributes

To request that data be transformed to AFP format remotely, on the Processing panel of a PSF for OS/390 printer definition, specify the following fields:

- **Data format**: Select the data formats that PSF accepts: **Line data** and **MO:DCA-P**. Also, select any of the data formats that Infoprint Manager can transform into a format that PSF accepts: **PCL**, **PDF**, and **PostScript**.

- **Filter**: For the **PCL**, **PDF**, or **PostScript** data formats, specify **aoprform.dll** if you want Infoprint Manager to perform the transform. Optionally, specify filter options.

- **Resubmit for filtering** field: Select this field only if necessary because it can adversely impact system performance. See "Resubmitting Documents to Print Interface for Filtering" on page 191 for more information.

Example 1

The following ISPF panel shows how to specify the remote transform filter in the Processing section of a PSF for OS/390 printer definition. Only a portion of the Processing panel is shown.

```
                          Processing

Printer definition name . myprinter_____
:

Print Interface Supported Data Formats and Associated Filters:
Data format:  Filter:

/  Line data  _____  (extend)
/  MO:DCA-P   _____  (extend)
/  PostScript aoprform.dll %filter-options -r 300 sys4_____  (extend)
/  PCL        aoprform.dll %filter-options -r 300 sys4_____  (extend)
/  PDF        aoprform.dll %filter-options -r 300 sys4_____  (extend)
_  SAP        _____  (extend)
_  Other      _____  (extend)


_  Resubmit for filtering

:
```

Results:

- If the input data stream contains PostScript, PCL, or PDF data, Print Interface calls the **aoprform.dll** filter before writing the data to the JES spool. The **aoprform.dll** filter passes the data to be transformed to the default port on the AIX or Windows NT/2000 system with host name `sys4`.
- Because the **%filter-options** option is specified, options specified in the **filter-options** job attribute are used; however, the **-r** option that is specified in the printer definition overrides the same option specified in the **filter-options** job attribute.
- The –r 300 option is passed to the Infoprint Manager transform daemon.

To print pages 3 through 10 of a PostScript file, a user could specify the following **filter-options** job attribute on an **lp** comand:

```
lp -d myprinter -o "filter-options='-p 3-10'" myfile.ps
```

Example 2

The following ISPF panel shows how to specify the remote transform filter in the Processing section of a PSF for OS/390 printer definition for an IBM Infoprint Color 130 Plus printer. Only a portion of the Processing panel is shown.

```
                            Processing

Printer definition name . myprinter_____

:
:
Print Interface Supported Data Formats and Associated Filters:
Data format:  Filter:

/  Line data    _____ (extend)
/  MO:DCA-P     _____ (extend)
/  PostScript aoprform.dll %filter-options -a fs45 -q color-toner-sa (extend)
/  PCL         pcl2afp.dll %filter-options                  (extend)
/  PDF         aoprform.dll %filter-options -a fs45 -q color-toner-sa (extend)
_  SAP         _____ (extend)
_  Other       _____ (extend)

_  Resubmit for filtering

:
:
```

Place your cursor on `Extend` and press Enter in order to enter the entire value in the PostScript and PDF **Filter** fields.

```
PostScript Filter

aoprform.dll %filter-options -a fs45 -q color-toner-saver=yes aixc
olor_____
```

```
PDF Filter

aoprform.dll %filter-options -a fs45 -q color-toner-saver=yes aixc
olor_____
```

Results:

- If the input data stream contains PostScript or PDF data, Print Interface calls the **aoprform.dll** filter before it writes data to the JES spool. The **aoprform.dll** filter passes the data to be transformed to the default port on the AIX system with host name `aixcolor`.
- If the input data stream contains PCL data, Print Interface calls the **pcl2afp.dll** filter before it writes data to the JES spool.
- Because the **%filter-options** option is specified for all transforms, options specified in the **filter-options** job attribute are used; however, the **-a** and **-q** options that are specified in the printer definition override the same options specified in the **filter-options** job attribute.
- The **-a** option causes the Infoprint Manager transform daemon to create FS45 image output; the **color-toner-saver** attribute causes the transform to create output that saves toner.

To print pages 3 through 10 of a PostScript file, a user can specify the following **filter-options** job attribute on an **lp** command:

```
lp -d myprinter -o "filter-options='-p 3-10'" myfile.ps
```

Converting Data from EBCDIC to ASCII or ASCII to EBCDIC

Print Interface can convert data from EBCDIC to ASCII or from ASCII to EBCDIC before writing text data to the JES spool. Print Interface automatically detects the following types of formatted data and does *not* convert the data: PCL, PDF, PostScript, SAP, and AFP (also called MO:DCA-P).

Print Interface uses the **iconv** conversion utility provided with z/OS to convert text data between EBCDIC and ASCII code pages. You can specify the document and printer code pages that Print Interface uses as the source and target code pages. Refer to *z/OS C/C++ Programming Guide* if you need more information about the **iconv** utility.

If a filter is specified in the printer definition, Print Interface converts data from one code page to another before calling the filter.

Procedure for Specifying Attributes

On the Processing panel, specify:

- **Document code page** field: Leave this field blank, or specify the code page used to create documents submitted to this printer definition. In most cases, you should leave this field blank. If the field is blank, Print Interface determines the appropriate code page as follows:
  - If the print request was submitted from the local z/OS system (with, for example, the **lp** command or the AOPPRINT procedure), Print Interface uses the document code page for the z/OS locale. This is usually an EBCDIC code page.
  - If the print request was submitted from a remote system, Print Interface uses the ASCII code page defined in the Infoprint Server configuration file or the default ASCII code page, ISO8859-1. Refer to *z/OS Infoprint Server Customization* for information about the configuration file.

  Note: To print ASCII documents from the local z/OS system, specify an ASCII code page (for example, IBM-850) either in the **Document code page** field of the printer definition or in the **document-codepage** job attribute

(on, for example, the **lp** command.) Refer to *z/OS Infoprint Server User's Guide* for information about the **lp** command and AOPPRINT procedure.

- **Printer code page** field: Specify the code page the printer uses to print the job. In an IP PrintWay printer definition, specify the name of an ASCII code page (such as IBM-850). In a PSF for OS/390 printer definition, specify the name of an EBCDIC code page (such as IBM-037). If you use ISPF panels to create printer definition, the ASCII or EBCDIC code page specified in the Infoprint Server configuration file is displayed in this field.

    Note: If this field is blank, Print Interface does not convert data from one code page to another.

Notes:

1. You can specify any code pages supported by z/OS. For code page names, refer to *z/OS C/C++ Programming Guide*.

2. You do *not* need to specify code page attributes in the printer definition unless you need to change either the document or printer code page. If you use the Infoprint Server ISPF panels to create printer definitions, by default, the printer code page field already contains the name of either an EBCDIC or ASCII code page, depending on the target printer. In an IP PrintWay printer definition, the default code page is the ASCII code page specified in the Infoprint Server configuration file. In a PSF for OS/390 or General printer definition, the default code page is the EBCDIC code page specified in the Infoprint Server configuration file.

Mapping Output Bin and Input Tray Names to Numbers for an IBM AFP Printer

The input tray is the tray on the printer which serves as the paper source. The output bin is a bin on the printer where printed jobs are delivered. The **input-tray** and **output-bin** job attributes let users specify a tray name, such as **3–hole** and a bin name, such as **staple**.

If you define input tray or output bin names in a printer definition, then a job submitter can use those names in the **input-tray** or **output-bin** job attribute. If you do *not* define *any* tray or bin names, Print Interface ignores the **input-tray** or **output-bin** job attribute. If, however, you define *some* tray or bin names, Print Interface rejects a print request that specifies an undefined tray or bin name in the job attribute.

When you define input tray names, you must map the names to the numbers that an IBM AFP printer uses for paper-source identification; when you define output bin names, you must map the names to the bin numbers that an IBM AFP printer uses for output-bin identification. Refer to your printer documentation for tray and bin numbers used by the printer.

The AFP to PCL and AFP to PostScript transforms map the AFP tray number you specify in the printer definition to the actual printer tray number using mapping values specified in the AOP_TRAYID environment variable of the transform configuration file. For example, by default, tray number 2 is mapped to tray number 4 for a PCL printer. Refer to *z/OS Infoprint Server Customization* for information about the AOP_TRAYID environment variable.

Note: Whether or not you define input tray or output bin names in a printer definition, a job submitter can specify the tray and bin number directly using,

the **input-tray-number** and **output-bin-number** job attributes or the INTRAY and OUTBIN JCL parameters. The job submitter can specify any tray and bin numbers; you do not need to specify the numbers in the printer definition.

Procedure for Specifying Attributes

On the Processing panel, specify:

- **Input tray name** and **Number** fields: Specify a name and the tray number used by the IBM AFP printer. The AFP to PCL transform and the AFP to PostScript transform map this number to another printer tray number.

- **Output bin name** and **Number** fields: Specify a name and the bin number used by the printer.

Example

The following ISPF panel shows how to map input tray names and output bin names to numbers in the Processing section of a PSF for OS/390 printer definition. Only a portion of the ISPF panel is shown.

```
                         Processing

 ⋮

Input tray name:  Number:      Output bin name:  Number:

top              1            staple           4
bottom           2            side             2
envelope         65           top              1
manual           100
3-hole           3
```

If a user specifies the **input-tray-name=envelope** job attribute, Print Interface allocates the output data set on the JES spool with tray number 65. If the printer is an IBM AFP printer, PSF uses tray number 65 when communicating with the printer. The AFP to PCL and AFP to PostScript transforms, by default, map tray number 65 to tray number 2 and use tray number 2 in the PCL and PostScript data stream.

If a user specifies the **output-bin=staple** attribute on the **lp** command, Print Interface allocates the output data set with bin number 4. If the printer is an IBM AFP printer, PSF uses bin number 4 when communicating with the printer. The AFP to PCL and AFP to PostScript transforms also use bin number 4 in the PCL or PostScript data stream.

Using the Print Interface Subsystem

A z/OS job submitter can specify the SUBSYS parameter on the DD JCL statement to request that the Print Interface subsystem process output data created by the batch application. SUBSYS subparameters are:
- Name of the Print Interface subsystem
- Name of the printer definition to use
- Infoprint Server job attributes

The job submitter can also specify other parameters on the DD and OUTPUT JCL statements that the Print Interface subsystem supports.

The Print Interface subsystem transforms data from one format to another (if transforms are requested in the printer definition) and allocates a sysout data set on the JES spool. The Print Interface subsystem can be used to print to any type of printer.

When you create a printer definition to be used with the Print Interface subsystem, you do *not* need to specify any special fields; therefore, if you have already created a printer definition, no changes are required.

Typically, you create one printer definition for each printer. However, when creating printer definitions to be used just with the Print Interface subsystem, you can simplify administration by creating only one printer definition for all printers that share the same attributes. If you create one printer definition for printing to several printers, the job submitter must specify the JCL parameters that are required to direct the output to the desired printer:

- If you create one PSF for OS/390 printer definition for all printers controlled by PSF for OS/390, the job submitter must specify the JCL parameters that correspond to the JES work-selection criteria for that printer, for example the output class and destination name.

  Example: This example shows the DD and OUTPUT statements that can be used to direct output to a specific PSF printer using a printer definition named `anyafpprinter`:

  ```
  //JOB1    JOB ...
  //STEP1   EXEC PGM=USERA
  //OUTDS1  OUTPUT CLASS=F,DEST=PRT003
  //DD1     DD SUBSYS=(AOP1,'anyafpprinter'),OUTPUT=(*.OUTDS1)
  ```

- If you create one IP PrintWay printer definition for all printers that use the LPR protocol, the job submitter must specify the printer's IP address and print queue name.

  Example: This example shows the DD and OUTPUT statements that can be used to direct output to a specific printer, using a printer definition named `anypsprinter`:

  ```
  //JOB2    JOB ...
  //STEP1   EXEC PGM=USERA
  //OUTDS1  OUTPUT DEST='IP:PRINTER1.XYZ.COM',PRTQUEUE='queue'
  //DD1     DD SUBSYS=(AOP1,'anypsprinter'),OUTPUT=(*.OUTDS1)
  ```

- If you create one IP PrintWay printer definition for all printers that use the direct sockets protocol, the job submitter must specify the printer's IP address and port number on the OUTPUT JCL statement.

  Example: This example shows the DD and OUTPUT statements that can be used to direct output to a specific printer, using a printer definition named `anynetprinter`:

  ```
  //JOB2    JOB ...
  //STEP1   EXEC PGM=USERA
  //OUTDS1  OUTPUT DEST='IP:PRINTER2.XYZ.COM',PORTNO='2501'
  //DD1     DD SUBSYS=(AOP1,'anynetprinter'),OUTPUT=(*.OUTDS1)
  ```

Recommendation: Create one printer definition for each printer so that users can use all job submission methods to print to the printer, including those job submission methods that do not permit the job submitter to specify the JES output class, destination name, or IP address. For example, the **lp** command does not let you specify the JES output class or destination name. And, when the IP PrintWay resubmit for filtering function is used, the printer's IP address cannot be specified on the OUTPUT JCL statement.

When the Print Interface subsystem is used, JES always assigns each data set to a separate JES output subgroup. This is true even if the data set would otherwise be in the same JES output subgroup as other data sets in the job step. Therefore, if the printer is controlled by IP PrintWay, the following results occur:

- Data sets in the same job step might not print together or might not print in the original order.
- Data sets in the same job step are always sent in separate e-mails.
- If you currently add a separator page before the first data set in a JES output subgroup, that separator page now prints before each data set.

Related task: Create a default Infoprint Server printer definition, as described in "Creating the Infoprint Server Default Printer Definition" on page 118.

Procedure for Specifying Attributes

When you create a printer definition to be used with the Print Interface subsystem, fields in the following sections of the printer definition have special considerations:

- **Main** section:
  - **Printer definition name** field: To use the Print Interface subsystem, the job submitter must specify the printer definition name in either the SUBSYS or FSSDATA JCL parameter. This name is case sensitive; therefore, the job submitter must enter it exactly as you specify it in the printer definition.
  - **Use DEST, CLASS, and FORMS for IP PrintWay printer selection** field: The Print Interface subsystem ignores this field. The job submitter must specify the name of the printer definition; if none is specified, the Print Interface subsystem and IP PrintWay use the Infoprint Server default printer definition. (The default Infoprint Server default printer definition is different from the IP PrintWay default printer definition.)
- **Allocation** section: The job submitter can specify JCL parameters and job attributes that correspond to all of the attributes in this section of the printer definition; therefore, these attributes are not required. The JCL parameters and job attributes specified during job submission override the attributes specified in the printer definition.

  Recommendation: Even though the job submitter can specify these same attributes in JCL parameters, specify default values for required JCL parameters, for example:
  - In a PSF for OS/390 printer definition, if the JES output class and destination name are JES work-selection criteria for the printer, specify the CLASS and DEST fields. If you do, the job submitter can omit the CLASS and DEST parameters on the OUTPUT JCL statement.
  - In an IP PrintWay printer definition, if the JES output class is the JES work-selection criteria for IP PrintWay, specify the CLASS field. If you do, the job submitter can omit the CLASS parameter on the OUTPUT JCL statement.
- **Processing** section:
  - **Filters** fields: Because the Print Interface subsystem can transform data, specify the data transforms provided by Infoprint Server Transforms as filters. Also, specify the **%filter-options** option for each filter. If you do not specify the **%filter-options** option, the Print Interface subsystem ignores the **filter-options** job attribute in the SUBSYS JCL parameter.
  - **Resubmit for filtering** field: IP PrintWay ignores this field because the Print Interface subsystem has already transformed the data.

    Recommendation: Select this field so that IP PrintWay transforms data sets when the job submitter does not use the Print Interface subsystem.
  - **Maximum document size** field: If the transformed data written to the sysout data set exceeds the number of bytes specified in this field, the Print Interface subsystem does not allocate any data sets in the job step and returns a JCL error.

- **Maximum copies** and **xxxx-supported** fields: The Print Interface subsystem validates that values in the corresponding JCL parameters and job attributes are supported. If not, the Print Interface subsystem does not allocate any data sets in the job step and returns a JCL error. See "Validating That Documents Can Print as Requested" on page 96 for more information.
- **NetSpool Options** section: NetSpool does *not* use the Print Interface subsystem; therefore, the Print Interface subsystem ignores attributes specified in this section.
- **NetSpool End-of-File** section: NetSpool does *not* use the Print Interface subsystem; therefore, the Print Interface subsystem ignores attributes specified in this section.
- **IP PrintWay Options** section: The **Dataset grouping** field does not apply because JES assigns each data set to a different JES output subgroup.
- **Protocol** section: You must fill in the required fields. However, the DEST=IP, PRTQUEUE, and PORTNO parameters on the OUTPUT JCL statement override the printer's IP address, print queue name, and port number.

Example 1. A PSF for OS/390 Printer Definition

The following ISPF panels show a printer definition that can be used for printing to a PSF-controlled printer using the Print Interface subsystem. Only a portion of some ISPF panels are shown.

```
                    PSF for OS/390 Printer Definition

 Printer definition name . myafpprinter
 Description . _____ (extend)
 Location. . . Building 003_____ (extend)


                         Component name          Custom values
 Section                 (enter to list)       (enter to customize)
 Allocation          => _____        => *
 Processing          => _____        => *
 NetSpool options    => _____        => __
 NetSpool end-of-file => _____        => __

 NetSpool LU name . _____     LU classes . . __  __  __  __  __  __   (extend)
```

```
                              Allocation

 Printer definition name . myafpprinter

 Spool allocation values:
    CLASS . . . . F               LINECT. . . ___
    DEST. . . . . PRT003          PRMODE. . . _____


 :
```

```
                                  Processing

Printer definition name . myafpprinter___

:
Supported data formats and associated filters:
Data format:  Filter:

/ Line data    _____  (extend)
/ MO:DCA-P     _____  (extend)
/ PostScript   ps2afp.dll  %filter-options -r 300 _____ (extend)
/ Text         _____  (extend)
/ PCL          pcl2afp.dll -c letter_300 %filter-options _____ (extend)
/ PDF          ps2afp.dll  %filter-options -r 300 _____ (extend)
/ SAP          sap2afp.dll %filter-options -r 300 _____ (extend)
_ Other        _____  (extend)

:
 Maximum document size . _____
 Maximum copies. . . . . _____
 Forms supported . . . . _____ _____ _____ _____ _____
 Duplex supported. . . . / Simplex   / Duplex   / Tumble
 Print-error reporting supported . / Character  / Position

:
```

Result: A job submitter can use the following JCL statements to print pages 1
through 10 of PostScript data to this printer.

```
//JOB1   JOB  ...
//STEP1  EXEC PGM=USERA
//OUTDS1 OUTPUT FORMDEF=MYFDEF,USERLIB=MYLIB
//DD1    DD SUBSYS=(AOP1,'myafpprinter','filter-options="-p 1-10"'),
//         DSNAME=&&MYDATA,OUTPUT=*.OUTDS1
```

1. The Print Interface subsystem accepts line data, AFP data, PCL data, PostScript
   data, PDF data, and SAP data and calls the associated transform. Because the
   %filter-options option is specified for the transform, and the **filter-options**
   attribute is specified in the SUBSYS parameter of the DD JCL statement, the
   transformed output consists only of pages 1 through 10.

2. The subsystem allocates a sysout data set on the JES spool with output class
   F, destination name PRT003, and data set name MYDATA. JES defaults apply
   for other output parameters that are not specified in the JCL or in the Allocation
   section of the printer definition; for example, the JES default form name is used.

3. The subsystem writes the transformed data to the sysout data set.

4. The PSF for OS/390 printer that prints data sets in class F with destination
   name PRT003 selects the data set from the JES spool and prints it, using form
   definition F1MYFDEF in library MYLIB to format the data.

Example 2. An IP PrintWay Printer Definition

The following ISPF panels show a printer definition that can be used for printing to
an IP PrintWay-controlled printer that accepts PCL data using the Print Interface
subsystem. Only a portion of some ISPF panels are shown.

```
                       IP PrintWay Printer Definition

Printer definition name . mypclprinter
Description . _____ (extend)
Location. . . Atlanta_____  (extend)

                       Component name          Custom values
Section                (enter to list)         (enter to customize)
Allocation          => _____         => *
Processing          => _____         => *
NetSpool options    => _____         => __
NetSpool end-of-file => _____        => __
IP PrintWay options => _____         => __
Protocol            => _____         => *

_ Use DEST, CLASS, and FORMS for IP PrintWay printer selection
NetSpool LU name . _____    LU classes . . __  __  __  __  __  __   (extend)
```

```
                              Allocation

Printer definition name . mypclprinter

Spool allocation values:
   CLASS . . . . . P            LINECT. . . ___
   DEST. . . . . _____       PRMODE. . . _____

⋮
```

```
                              Processing

Printer definition name . mypclprinter

⋮

Supported data formats and associated filters:
Data format:  Filter:

/ Line data  afp2pcl.dll -c US %filter-options_____  (extend)
/ MO:DCA-P   afp2pcl.dll -c US %filter-options_____  (extend)
_ PostScript _____  (extend)
/ Text       aopfiltr.so_____  (extend)
/ PCL        _____  (extend)
_ PDF        _____  (extend)
_ SAP        _____  (extend)
_ Other      _____  (extend)

/ Resubmit for filtering

⋮

 Maximum document size . _____
 Maximum copies. . . . . ____
 Forms supported . . . . _____ _____ _____ _____ _____
 Duplex supported. . . . / Simplex   / Duplex   / Tumble
 Print-error reporting supported . / Character  / Position

⋮
```

```
                              LPR Protocol

 Printer definition name . mypclprinter

 Printer IP address . printer1.xyz.com_____  (extend)
 Print queue name . . text_____  (extend)

⋮
```

Result: A job submitter can use the following JCL statements to print AFP data to the printer:

```
//JOB1   JOB  ...
//STEP1  EXEC PGM=USERA
//OUTDS1 OUTPUT FORMDEF=MYFDEF,USERLIB=MYLIB
//DD1    DD SUBSYS=(AOP1,'mypclprinter'),DSNAME=&&MYDATA,
//          OUTPUT=*.OUTDS1
```

1. The Print Interface subsystem accepts text data, line data, AFP data, or PCL data and calls the associated transform. The AFP to PCL transform uses form definition F1MYFDEF in library MYLIB to format the data.

2. The subsystem allocates a sysout data set on the JES spool in JES output class P with data set name MYDATA. JES defaults are used for output parameters that are not specified in the JCL or in the Allocation section of the printer definition.

3. The IP PrintWay FSA that selects data sets in JES output class P sends the data to the printer whose address is specified in printer definition `mypclprinter`.

Creating the Infoprint Server Default Printer Definition

The default Infoprint Server printer definition is used in the following situations:

- **lp command:** When the job submitter does not specify a printer definition on the **lp** command and the PRINTER and LPDEST environment variables are not set, Print Interface uses the default printer definition to print the file.

- **Print Interface subsystem:** When the job submitter does not specify the name of a printer definition in either the SUBSYS parameter on the DD JCL statement or in the FSSDATA parameter on the OUTPUT JCL statement, Print Interface uses the default printer definition to print the data set.

You can use any printer definition that you have already created as the default printer definition; however, you must specify the name of the default printer definition on the Infoprint Server Configuration panel. By default, the name of the default printer definition is `lp1`.

Procedure for Specifying the Name of the Default Printer Definition

To specify the name of the default printer definition, follow these steps:

1. On the Infoprint Server: Printer Inventory Manager panel, select **7 Configure**.

2. On the Configuration panel, specify the name in the **Default printer** field.

Example
The following ISPF panel shows how to specify the name of the default printer definition.

```
                              Configuration
  ⋮

Printer Inventory:
    Configuration file . /etc/Printsrv/aopd.conf
    NLS path . . . . . . /usr/lpp/Printsrv/En_US/%N
    Language . . . . . . En_US
    Default printer. . . default-printer

  ⋮
```

Results:

- The **lp** command uses the printer definition named `default-printer` if the job submitter does not specify a printer definition name and the PRINTER and LPDEST variables are not set.
- The Print Interface subsystem uses the printer definition named `default-printer` if the job submitter does not specify a printer definition name.

Chapter 12. Planning Printer and Printer Pool Definitions for NetSpool

Before you can use NetSpool to print VTAM application data, you must specify fields (attributes) that NetSpool uses in the printer definition. Table 34 on page 367 summarizes the attributes that NetSpool uses and indicates whether each attribute is required or optional. If a printer definition does not already exist for the target printer or e-mail destination, you must create one; if a printer definition already exists, simply edit it and specify the attributes that NetSpool uses.

You can configure printer definitions for use by NetSpool before or after starting the NetSpool program. If NetSpool is already started, NetSpool automatically starts the printer LU when you save the printer definition, provided that the printer LU is assigned to one of the LU classes that NetSpool has started. If the printer LU is not active in VTAM, NetSpool automatically starts it when the printer LU becomes active.

If you change printer attributes in an existing printer definition while a VTAM session with the printer LU is active, in most cases NetSpool uses the changed values when it allocate the next output data set on the JES spool. However, changes to the LU class and end-of-file rules are related to the VTAM session and do not take effect with the next data set; see "Grouping NetSpool Printer LUs into LU Classes" on page 122 and "Specifying How NetSpool Determines End-of-File" on page 139 for information.

In addition to configuring the printer definition for use by NetSpool, you must also define the NetSpool printer LU name to VTAM. If NetSpool is already started, define the printer LU to VTAM *before* configuring the printer definition, because NetSpool attempts to start the printer LU as soon as the printer definition is saved in the Printer Inventory. See Chapter 15, "Defining NetSpool Printer LUs to VTAM" on page 213 for information.

This chapter describes how to specify printer attributes required to accomplish the following tasks:

Task	See Page:
Specifying the NetSpool Printer LU Name	122
Grouping NetSpool Printer LUs into LU Classes	122
Specifying JES Allocation Parameters	123
Converting SCS and 3270 Data Streams to Line Data Streams	125
Converting SCS and 3270 Data Streams to PCL Data Streams	129
Selecting No Data Stream Conversion	136
Selecting a Font	137
Specifying How NetSpool Determines End-of-File	139
Broadcasting Data Using Multiple Printer Definitions	142

Note: This chapter contains planning information only. For detailed information about each attribute (including the values you can specify, restrictions, and examples), use the online help for each field on the ISPF panels.

Specifying the NetSpool Printer LU Name

In each printer definition, you must specify the NetSpool printer logical unit (LU) name that you want to associate with the printer. NetSpool uses this name to establish a session with VTAM applications. This name is the VTAM secondary LU (SLU) name and must match the name in the ACB parameter of the APPL statement. See Chapter 15, "Defining NetSpool Printer LUs to VTAM" on page 213 for information about how to select NetSpool printer LU names and how to create APPL statements.

Each printer LU name in the Printer Inventory must be unique, that is, you cannot specify the same LU name in more than one printer definition. If you need to associate more than one NetSpool printer LU name with the same printer, you must create additional printer definitions for that printer. These printer definitions can be identical except for the printer definition name and the NetSpool LU name.

If the printer LU name is in one of the LU classes that NetSpool has started, NetSpool automatically attempts to start a VTAM session with the printer; if the printer LU is not yet active in VTAM, NetSpool automatically starts the printer when the printer LU becomes active. If the printer LU name is not in one of the started LU classes, the operator must use the NetSpool ADD command to add it; see "Starting NetSpool Printer LUs" on page 40 for information.

IBM recommends that you do not change the LU name in a printer definition while a VTAM session with the printer is active.

Procedure for Specifying Attributes

To specify the NetSpool printer LU name, specify the following attribute on the first ISPF panel displayed for the printer definition:

*   **LU Name** field: Specify the LU name.

"Main ISPF Panel for IP PrintWay Printer Definition" on page 373 shows the ISPF panel that you use to specify LU name. Use the online help for the ISPF panel and the help for each field on the panel for more information.

Grouping NetSpool Printer LUs into LU Classes

NetSpool lets you group NetSpool printer LUs into *logical-unit classes*. A class is identified by a number from 1 to 64.

You might want to group logical printers into classes for the following reasons:

*   To start classes of logical printers at different times. For example, you might want to process requests for one class of printers during the day and process requests for another class of printers during the night.
*   To spread processing of different classes of logical printers over different address spaces. You might want to do this if you have a large number of logical printers.

The NetSpool startup procedure identifies which LU classes NetSpool is to start. After NetSpool is started, the operator can dynamically start and stop individual logical printers that are in different classes from those specified when NetSpool was started. Refer to *z/OS Infoprint Server Customization* for information about the NetSpool startup procedure. See Chapter 4, "Starting and Stopping NetSpool" on page 37 for information about how to start printers in other classes.

Each NetSpool printer LU can belong to one or more LU classes. If you assign a printer LU to more than one class, NetSpool starts that printer LU when you start any one of the classes. For example, if you assign a printer LU to classes 1 and 2, NetSpool starts the printer LU if either class 1 *or* class 2 is specified in the NetSpool startup procedure.

Grouping NetSpool LUs into classes is optional. If you do not specify an LU class, NetSpool assigns the printer LU to class 1. When you start NetSpool, simply start class 1 and NetSpool will start all printer LUs defined in the Printer Inventory.

You can change the LU class for a printer definition. If you change the LU class after NetSpool has started the printer LU, NetSpool takes the following actions:

- If the new LU class is one of the classes that NetSpool has started, NetSpool automatically attempts to start the printer LU. Use the VARY ACT command to make sure that the LU is active in VTAM.
- If the new LU class is not in one of the started LU classes, NetSpool stops the printer LU after the VTAM application ends the session. To start the printer LU again, use the VARY ACT command to activate the LU in VTAM and then use the NetSpool LUNAME ADD command.

Procedure for Specifying Attributes

On the first ISPF panel for the printer definition, specify:

- **LU Classes** field: Specify one or more LU classes, each class represented by a number (1 – 64).

"Main ISPF Panel for IP PrintWay Printer Definition" on page 373 shows the ISPF panel that you use to specify LU classes.

Specifying JES Allocation Parameters

You must specify attributes in the Allocation section of a printer definition to tell NetSpool how to allocate output data sets on the JES spool. For example, you can specify the JES output class, destination name, and so on.

Each attribute in the Allocation section of a printer definition corresponds to a parameter that you can specify on an OUTPUT JCL statement. "Allocation Attributes and Corresponding OUTPUT or DD Statement Parameters" on page 363 lists fields in the Allocation section and the corresponding OUTPUT JCL parameters. Refer to the *z/OS MVS JCL Reference* for an full explanation of each JCL parameter. The ISPF online help for each field summarizes the meaning of each field.

Some of the attributes apply only if the target printer is a PSF printer or if the printer definition is configured to use the AFP to PCL, AFP to PDF, or AFP to PostScript transform. The ISPF online help for each field identifies which fields are used by PSF and the transforms. Also see "Transforming AFP Data and Line Data to PCL, PDF, and PostScript Format" on page 205 for a list of the fields that apply when you use the AFP to PCL, AFP to PDF, or AFP to PostScript transform.

Print Interface also uses the attributes in the Allocation section to allocate data sets on the JES spool. In most cases, the same attributes are suitable for both NetSpool and Print Interface; if you need to specify unique attributes for NetSpool, you must create two separate printer definitions for the same printer.

Procedure for Specifying Attributes

On the Allocation panel, specify:

- **Spool allocation values** heading: The fields under this heading correspond to the OUTPUT JCL parameters that JES can use to direct output data sets from the JES spool to IP PrintWay, a PSF printer, or another JES functional subsystem application (FSA). In these fields, specify the appropriate JES work-selection parameters for the target printer:
  - In an IP PrintWay printer definition, specify the JES work-selection criteria for the IP PrintWay FSA. For example, if the JES work-selection criterion is class P, specify **P** in the **CLASS** field.
  - In a PSF for OS/390 printer definition, specify the JES work-selection criteria for the PSF printer FSA. For example, if the JES work-selection criteria are class E and destination BLDG5, specify **E** in the **CLASS** field and **BLDG5** in the **DEST** field.

  JES work-selection criteria are defined in the JES3 DEVICE statement and the JES2 PRT*nnnnn* statement.

- Specify other fields that the AFP to PCL, AFP to PDF, or AFP to PostScript transform, PSF, IP PrintWay, and JES use:
  - If your installation uses the transforms, specify fields that the transforms use. See "Transforming AFP Data and Line Data to PCL, PDF, and PostScript Format" on page 205 for information about these fields.
  - In an IP PrintWay printer definition, specify fields that IP PrintWay uses. See "Specifying Attributes for Allocation" on page 166 for information about these fields.
  - In a PSF for OS/390 printer definition, specify fields that correspond to the JCL parameters that PSF uses. Refer to *PSF for OS/390 & z/OS: User's Guide* for information about these JCL parameters.

Tip: If you need to specify the same allocation attributes in more than one printer definition, specify the attributes in an Allocation component. Then, include that component in each printer definition to which the component applies.

Example

The following ISPF panel shows how to specify an output class and destination in the Allocation section of a printer definition.

```
                          Allocation

Spool allocation values:
   CLASS . . . . . E                  LINECT. . . ___
   DEST. . . . . BLDG5___             PRMODE. . . _____
   JES node. . . _____             PRTY. . . . __
   FCB . . . . . ___                  SEGMENT . . _____
   FLASH count . ___                  THRESHLD. . _____
   FLASH name. . ____                 UCS . . . . ___
   FORMS . . . . _____             WRITER. . . _____
   GROUPID . . . _____
   USERDATA
     . . _____ (extend)
   BURST . . . . . _  1. Yes  2. No
   HOLD. . . . . _  1. Yes  2. No
   OUTDISP . . . _  1. Purge  2. Leave  3. Keep  4. Hold  5. Write
Values for Separator Pages:
   Address
     . . _____(extend)
   Building . . _____
   Department . _____
   Name . . . . _____
   Room . . . . _____
   Title  . . . _____
Resource Related Values:
   Form definition . _____
   Character sets  . ___   ___  ___  ___
   Overlay front . . _____     Back . . _____
   Input tray  . . . ___
   Output bin  . . . ____
   Page definition . _____
   Resource library. _____ (extend)
   Image shift x-direction front . . _____     Back . . _____
               y-direction front . . _____     Back . . _____
Error Reporting Values:
   Print error reporting. . _  1. None  2. All  3. Character  4. Position
   Error disposition. . . . _  1. Default  2. Hold  3. Quit
   _ Print error messages
        Maximum messages. .___
Other Values:
   Notify . . . . . . . _____  at node . . _____
                        _____  at node . . _____
                        _____  at node . . _____
                        _____  at node . . _____
   Checkpoint pages . . _____
   Checkpoint seconds . _____
   Copies . . . . . . . ____
   Copy group . . . . . __  __  __  __  __  __  __  __
   Color map. . . . . . _____
   Com setup member . . _____
   JES form length. . . _____
   Resolution . . . . . ___
   Duplex. . . . . . . _  1. Simplex  2. Duplex  3. Tumble
   Label data pages . . _  1. Yes  2. No
   Restrict printable area . . _  1. Yes  2. No
   _ Table reference characters
```

NetSpool allocates output data sets in JES output class E and with destination name BLDG5. The FSA defined to JES with work-selection criteria of class E and destination BLDG5 selects the output data set for printing.

Converting SCS and 3270 Data Streams to Line Data Streams

In each printer definition, you can select a NetSpool formatting option. The formatting option controls how NetSpool formats the data streams created by your VTAM applications. You can select one of the following formatting options:

- Convert to line (default)

- Convert to PCL
- None

This section describes the **Convert to line** formatting option. When you select the **Convert to line** option, NetSpool converts SCS data streams (on VTAM LU type 1 sessions) and 3270 data streams (on VTAM LU type 0 and type 3 sessions) to line data streams.

You can select the **Convert to line** option for a wide range of printers, including:
- Line printers controlled by JES.

  Line printers that natively accept line data streams.
- IBM AFP printers controlled by PSF

  IBM AFP printers do not natively accept line data streams; however, PSF for OS/390 can convert line data streams to Intelligent Printer Data Streams (IPDS), which AFP printers accept.
- Network printers controlled by IP PrintWay

  Network printers do not natively accept line data streams; however, IP PrintWay can convert line data streams to ASCII text data streams, which most network printers accept. If you install the separately-priced AFP to PCL transform or AFP to PostScript transform, IP PrintWay can, instead, convert line data streams to PCL data streams or PostScript data streams.

  Note: The NetSpool **Convert to PCL** formatting option is also suitable for most network printers. When NetSpool converts input data streams to PCL data streams, it can support more of the formatting options in the original data streams, such as print density and line density, than when it converts to line data streams.

When you select the **Convert to line** option, NetSpool converts the printable data, SCS controls, and 3270 controls in the input data stream to line data with ANSI carriage-control characters. Carriage-control characters control line spacing and skipping operations. NetSpool supports most of the SCS and 3270 controls in the input data stream that are associated with printing; however, NetSpool ignores those SCS and 3270 controls for which no equivalent support exists in line data. NetSpool writes the line data to the JES spool in variable-length, blocked records, with a maximum record size of 4092 bytes.

In order to fill in the fields in the printer definition that are related to NetSpool formatting, you should understand the following functions that NetSpool provides when you select the **Convert to line** option:
- **Page formatting:** NetSpool formats data into lines and pages before writing it to the JES spool. The page formatting is different for SCS and 3270 input data streams.

  SCS data streams: NetSpool uses the SCS Set Horizontal Format (SHF) and SCS Set Vertical Format (SVF) controls in the input data stream to format data into lines and pages. The SHF and SVF controls specify page-formatting values such as line length, page length, margins, and tabs. The SHF and SVF controls take effect immediately and remain in effect until either the next SHF or SVF control or until NetSpool establishes another VTAM session with the printer.

  If the SCS data stream does *not* contain SHF and SVF controls, NetSpool uses default values. In each printer definition, you can specify the default values that NetSpool is to use for the line length, page length, margins, and tabs.

3270 data streams: NetSpool uses the 3270 Write Control Characters (WCCs) in the input data stream to format data into lines and pages. To change page-formatting values for 3270 data, the application programmer must change the WCCs generated by the VTAM application that creates the 3270 data. NetSpool does *not* use the SCS default page-formatting values specified in the printer definition when it formats 3270 data.

- **DBCS support:** NetSpool supports the following SCS and 3270 controls and orders, which identify double-byte character set (DBCS) strings:
  - Shift Out and Shift In
  - Set Attribute, with the Character Set attribute

  In addition, NetSpool supports the following 3270 orders, which identify DBCS strings:
  - Start Field Extended with the Character Set attribute
  - Modify Field with the Character Set attribute

  In place of these controls and orders, NetSpool inserts Shift Out and Shift In line-data controls where necessary in the line-data output. When you print DBCS data on printers controlled by PSF, you must select the PSF **SOSI2** option to prevent printing unwanted blanks.

Refer to *z/OS Infoprint Server Customization* for tables that describe how NetSpool converts SCS and 3270 data streams to line data streams.

Procedure for Specifying Attributes

Follow these steps to convert SCS and 3270 data streams to line data streams:

1. On the NetSpool Options panel, select the **Convert to line** formatting option.
2. On the Processing panel, optionally specify the following default page-formatting values, which NetSpool uses for input SCS data streams only:
   - **Line length** field: Specify the maximum number of columns on each line. This is the default value for the SCS maximum presentation position (MPP) value. Allowed values are 1-255; the default value is 80.
   - **Page length** field: Specify the maximum number of lines per page. This is the default value for the SCS maximum presentation line (MPL) value. Allowed values are 1-255. The default value is 1, which means that NetSpool does not control the number of lines that are placed on a page; the VTAM application controls the number of lines per page.
   - **Margins: Left** field: Specify the column number at which you want data to start on each line. This is the default value for the SCS left margin (LM) value. Allowed values are 1-255; the default value is 1.
   - **Margins: Right** field: Specify the column number at which you want data to end on each line. This is the default value for the SCS right margin (RM) value. Allowed values are 1-255; the default value is 80.
   - **Margins: Top** field: Specify the line number of the first line on each page. This is the default value for the SCS top margin (TM) value. Allowed values are 1-255; the default value is 1.
   - **Margins: Bottom** field: Specify the line number of the last line of data on each page. This is the default value for the SCS bottom margin (BM) value. Allowed values are 1-255; the default value is 1 (no bottom margin).

     If you specify a value of 1, NetSpool does not insert form feeds when the input data stream spaces past the bottom margin; however, NetSpool does insert form feeds when an explicit form feed or a Select Vertical Channel command occurs in the input data.

- **Tabs: Horizontal** field: Specify horizontal tabs. This is the default value for the SCS horizontal tab (HT) value. Allowed values are 0-255; the default is no horizontal tabs. The input data stream can add additional tab positions but cannot remove default tabs set in this field.

  NetSpool always sets the first tab to the left margin value; therefore, do not specify it. NetSpool ignores a value of 0. In the following example, NetSpool sets horizontal tabs at columns 6, 15, 50, 75, and 100.

  ```
  SCS Conversion:
     Margins:  Top . . .  ___    Bottom . .  ___    Left . . 6__    Right . .  ___
     Tabs:  Vertical . .  ___   ___   ___   ___   ___   (extend)
            Horizontal . 15_  50_  75_  100_  ___   (extend)
  ```

- **Tabs: Vertical** field: Specify vertical tabs. This is the default value for the SCS vertical tab (VT) value. Allowed values are 0-255; the default is no vertical tabs.

  NetSpool always sets the first tab to the top margin value; therefore, do not specify it. NetSpool ignores a tab value of 0. NetSpool uses the first eleven tabs as line numbers for Select Vertical Channel 2 through 12. In the following example, NetSpool sets:
  – Vertical tabs at lines 6, 20, 40, and 50
  – Vertical channels are set: CH01=6, CH02=20, CH04=40, CH05=50

  These vertical channels are *not* set: CH03, CH06 through CH12.

  ```
  SCS Conversion:
     Margins:  Top . . . 6__
     Tabs:  Vertical . . 20_  0_   40_  50_   ___   (extend)
  ```

3. If the printer is controlled by IP PrintWay:

   - To convert line data streams created by NetSpool to ASCII text data streams, select either the **Standard** or **Use FCB** option in the **Formatting** field on the IP PrintWay Options panel.

   - To convert line data streams created by NetSpool to either PCL or PostScript data streams, see "Transforming AFP Data and Line Data to PCL, PDF, and PostScript Format" on page 205 for information about how to specify the AFP to PCL or AFP to PostScript transform and select the **Resubmit for filtering** option.

4. If the printer is controlled by PSF for OS/390 and you print DBCS output, on the Allocation panel, specify:

   - **PRMODE** field: Specify **SOSI2**.
   - **Character sets** field: Specify a single-byte font and a double-byte font.

Tip: If you need to specify the same fields in more than one printer definition, specify the fields in components. Then, include those components in each printer definition to which the components apply.

Examples

The following examples show how to fill in the ISPF panels to convert SCS and 3270 input data streams to line data streams.

Example 1. Converting SCS Data Streams to Line Data Streams: The following ISPF panel shows how to request that NetSpool convert input data streams from VTAM applications to line data streams.

```
                           NetSpool Options

    Formatting . . . . 2   1. None  2. Convert to line  3. Convert to PCL
   .
   .
   .
```

The following ISPF panel shows how to specify default page-formatting values for
SCS data streams.

```
                             Processing
   .
   .
   .
   SCS Conversion:
      Margins:  Top . . . 6     Bottom . . 61    Left . . 3     Right . . 75
      Line length . . . . 80               Page length . . 66
      Tabs:  Vertical . . ___  ___  ___  ___  ___   (extend)
             Horizontal . 5   10   15   20   ___   (extend)
   .
   .
   .
```

Example 2. Converting 3270 Data Streams to Line Data Streams: The
following ISPF panel shows how to request that NetSpool convert input data
streams from your VTAM applications to line data streams.

```
                           NetSpool Options

    Formatting . . . . 2   1. None  2. Convert to line  3. Convert to PCL
   .
   .
   .
```

Converting SCS and 3270 Data Streams to PCL Data Streams

In each printer definition, you can select a NetSpool formatting option. The
formatting option controls how NetSpool formats the data streams created by your
VTAM applications. You can select one of the following formatting options:

- Convert to line (default)
- Convert to PCL
- None

This section describes the **Convert to PCL** formatting option. When you select the
Convert to PCL option, NetSpool converts SCS data streams (on VTAM LU type 1
sessions) and 3270 data streams (on VTAM LU type 0 or type 3 sessions) to
Printer Control Language (PCL) 5 data streams.

You can select **Convert to PCL** for printers controlled by IP PrintWay that accept
PCL data streams. When you select this option, IP PrintWay automatically transmits
PCL data streams created by NetSpool to the printer without additional page
formatting.

Most printers that accept PCL data streams can also accept text data streams.
Therefore, for these printers you can select either the NetSpool **Convert to PCL** or
the **Convert to line** formatting option. The **Convert to PCL** option provides the
following additional functions:

- For SCS data streams, NetSpool can support the following additional print control
  functions in the input data stream, thereby providing better print fidelity:
  - Line-density and print-density

- Page orientation
- Paper-source and output-bin
- Job-separation
- Duplex

When you select the **Convert to line** option, NetSpool *cannot* fulfill these requests in the input data stream due to limitations in line data.

- For SCS data streams, NetSpool can automatically change the orientation of the page between portrait and landscape on a page by page basis. NetSpool can also reduce print output, if necessary, to make the data fit on the line or page.

- For both SCS and 3270 data streams, NetSpool lets you specify the line density, print density, and page orientation for each printer in the printer definition. This means that you do not need to set these values at the printer's control panel or specify the PCL commands in the IP PrintWay **Document header** field.

The **Convert to PCL** option is *not* suitable, however, in the following printing situations; therefore, in these situations, instead select the **Convert to line** option:

- The printer is controlled by JES or PSF for OS/390. JES and PSF do not accept PCL data.

- Your VTAM applications generate DBCS data. NetSpool *cannot* support DBCS data when you select the **Convert to PCL** option.

- Your data streams contain special characters that require the use of TCP/IP translate tables to convert data from EBCDIC to ASCII. NetSpool does *not* use TCP/IP translate tables to convert data to ASCII; instead, NetSpool converts data between EBCDIC and ASCII code pages. When you select the **Convert to line** option, however, IP PrintWay can convert data using either TCP/IP translate tables or EBCDIC and ASCII code pages.

- You want to use a form definition and page definition to format your data and print it on a PCL printer. In this case, select the NetSpool **Convert to line** option and also use the AFP to PCL transform to convert line data streams created by NetSpool to PCL data streams.

When you select the **Convert to PCL** option, NetSpool converts EBCDIC data, SCS controls, and 3270 controls in the input data stream to ASCII data and PCL commands. NetSpool supports most of the SCS and 3270 controls in the input data stream that are associated with printing. NetSpool ignores those SCS and 3270 controls for which no equivalent PCL commands exist. NetSpool writes PCL data streams to the JES spool in variable-length, blocked format, with a maximum record size of 32752 bytes.

In order to fill in the fields in the printer definition that are related to NetSpool formatting, you should understand the following functions that NetSpool provides when you select the **Convert to PCL** option:

- **EBCDIC to ASCII conversion:** NetSpool converts data from EBCDIC to ASCII before writing it to the JES spool. To convert data to ASCII, NetSpool converts data from an EBCDIC code page (also called the document code page) to an ASCII code page (also called the printer code page) using the IBM **iconv** conversion utility. For most printing situations, the default document and printer code pages that NetSpool uses are suitable; however, in each printer definition, you can specify different document and printer code pages.

- **Page formatting:** NetSpool formats data into lines and pages before writing it to the JES spool. The page formatting is different for SCS and 3270 input data streams.

SCS data streams: NetSpool uses SCS Set Horizontal Format (SHF) and SCS Set Vertical Format (SVF) controls to format data into lines and pages. The SHF and SVF controls specify page-formatting values such as line length, page length, margins, and tabs. The SHF and SVF controls take effect immediately and remain in effect until either the next SHF or SVF control or until NetSpool starts writing a new output data set to the JES spool.

If the SCS data stream does *not* contain SHF and SVF controls, NetSpool uses default values. In each printer definition, you can specify the default values that NetSpool is to use for the line length, page length, margins, and tabs.

3270 data streams: NetSpool uses page-formatting values in the 3270 Write Control Characters (WCCs) in the 3270 data stream to format data into lines and pages. To change page-formatting values for 3270 data, the application programmer must change the WCCs generated by the VTAM application that creates the 3270 data. For 3270 data streams, NetSpool does *not* use any of the default page-formatting values for line length, page length, margins, and tabs that you specify in the printer definition.

- **Print density, line density, and page orientation:** NetSpool can generate PCL commands to set the print density (characters per inch), line density (lines per inch), and page orientation (portrait or landscape). NetSpool processing differs for SCS and 3270 data streams.

  – **SCS data streams:** NetSpool converts the SCS Set Print Density (SPD) and SCS Set Line Density (SLD) controls in the input data stream to corresponding PCL commands. In each printer definition, you can specify the default print density and line density that NetSpool is to use when the SCS data stream does not contain SPD and SLD controls. The SCS data stream does not contain orientation controls; however, in each printer definition, you can specify the page orientation that NetSpool is to use. Also, you can request that NetSpool automatically determine the appropriate orientation of each page, as described below.

  – **3270 data streams:** 3270 data streams do *not* contain print density, line density, and page orientation information. In each printer definition, you can specify the print density, line density, and page orientation that NetSpool is to use.

For both SCS and 3270 data streams, if you do not specify density or orientation values in the printer definition, the values set at the printer's control panel are used unless the density and orientation are specified in another location. Density and orientation can be specified in several places. If they are specified in more than one place, the *first* value in the following list is used. For example, a value specified in the SCS data stream overrides all other values.

1. SCS controls that occur in the input SCS data stream, including any PCL commands and SCS controls added by the NetSpool Transparent Data exit.

2. PCL commands or SCS controls added by the NetSpool Beginning of File exit

3. Density and orientation values you specify in the printer definition under the **NetSpool PCL Conversion** heading

4. PCL commands you specify in the IP PrintWay **Document header** field in the printer definition

5. PCL commands added by the IP PrintWay Begin Data Set exit

6. The default value set at the printer's control panel

- **Automatic page orientation (SCS data streams only):**

When you select the automatic page orientation option in the printer definition, NetSpool automatically determines the appropriate orientation (portrait or

landscape) of each page based on the line length and page length of that page. If necessary, NetSpool reduces the size of the print (the font size) and increases the line density so that data fit on a line.

NetSpool uses the line and page lengths specified in SCS controls and in the **Print density**, **Line density**, **Line length**, and **Page length** fields to determine the appropriate page orientation for each page. If the line length is greater than the page length, NetSpool sets the orientation to landscape; otherwise it sets the orientation to portrait. When NetSpool sets the orientation to landscape, if the **Line length** field (or the MPP in the SCS SHF control) is greater than 106, NetSpool sets the print density to 15 characters per inch and the line density to 8 lines per inch.

Refer to the following publications for more information:

- *z/OS Infoprint Server User's Guide* for tables that describe how NetSpool converts SCS and 3270 data streams to PCL data streams
- *z/OS Infoprint Server Customization* for information about NetSpool exits

Procedure for Specifying Attributes

Follow these steps to request that NetSpool convert SCS and 3270 data streams to PCL data streams:

1. On the NetSpool Options panel, select the **Convert to PCL** formatting option.
2. On the Processing panel, optionally specify code pages for EBCDIC to ASCII conversion:

   - **Document code page** field: Leave this field blank or specify the name of an EBCDIC code page supported by IBM. If you leave this field blank, the default code page is the EBCDIC code page specified in the Infoprint Server configuration file, **aopd.conf**. If no code page is specified in the configuration file, NetSpool uses code page IBM-1047.
   - **Printer code page** field: Specify the name of an ASCII code page that is supported by IBM. The ISPF panels automatically display the ASCII code page that is specified in the Infoprint Server configuration file, **aopd.conf**. If no code page is specified in the printer definition, NetSpool uses code page IBM-850.

   Guidelines:

   a. For most printing situations, you do *not* need to modify the code pages in the printer definition. The initial values in the printer definition are generally suitable.
   b. If you plan to use this printer definition with Print Interface as well as with NetSpool, leave the **Document code page** field blank and specify a code page in the **Printer code page** field. See "Converting Data from EBCDIC to ASCII or ASCII to EBCDIC" on page 110 for information about how Print Interface uses these fields.
   c. You can specify any code pages supported by IBM. For valid code page names, refer to *z/OS C/C++ Programming Guide*.
3. On the Processing panel, optionally specify the following default page-formatting values, which NetSpool uses for input SCS data streams only:

   - **Line length** field: Specify the maximum number of columns on each line. This is the default value for the SCS maximum presentation position (MPP) value. Allowed values are 1-255; the default value is 80.
   - **Page length** field: Specify the maximum number of lines per page. This is the default value for the SCS maximum presentation line (MPL) value. Allowed values are 1-255. The default value is 1, which means that NetSpool

does not control the number of lines that are placed on a page; the VTAM application controls the number of lines per page.

- **Margins: Left** field: Specify the column number at which you want data to start on each line. This is the default value for the SCS left margin (LM) value. Allowed values are 1-255; the default value is 1.
- **Margins: Right** field: Specify the column number at which you want data to end on each line. This is the default value for the SCS right margin (RM) value. Allowed values are 1-255; the default value is 80.
- **Margins: Top** field: Specify the line number of the first line on each page. This is the default value for the SCS top margin (TM) value. Allowed values are 1-255; the default value is 1.
- **Margins: Bottom** field: Specify the line number of the last line of data on each page. This is the default value for the SCS bottom margin (BM) value. Allowed values are 1-255; the default value is 1 (no bottom margin).

  If you specify a value of 1, NetSpool does not insert form feeds when the input data stream spaces past the bottom margin; however, NetSpool does insert form feeds when an explicit form feed or a Select Vertical Channel command occurs in the input data.
- **Tabs: Horizontal** field: Specify horizontal tabs. This is the default value for the SCS horizontal tab (HT) value. Allowed values are 0-255; the default is no horizontal tabs. The input data stream can add additional tab positions but cannot remove default tabs set in this field.

  NetSpool always sets the first tab to the left margin value; therefore, do not specify it. NetSpool ignores a value of 0. In the following example, NetSpool sets horizontal tabs at columns 6, 15, 50, 75, and 100.

```
SCS Conversion:
   Margins: Top . . . ___    Bottom . . ___    Left . . 6___    Right . . ___
   Tabs: Vertical . . ___  ___  ___  ___  ___  (extend)
         Horizontal . 15_  50_  75_  100_  ___  (extend)
```

- **Tabs: Vertical** field: Specify vertical tabs. This is the default value for the SCS vertical tab (VT) value. Allowed values are 0-255; the default is no vertical tabs.

  NetSpool always sets the first tab to the top margin value; therefore, do not specify it. NetSpool ignores a tab value of 0. NetSpool uses the first eleven tabs as line numbers for Select Vertical Channel 2 through 12. In the following example, NetSpool sets:
  – Vertical tabs at lines 6, 20, 40, and 50
  – Vertical channels are set: CH01=6, CH02=20, CH04=40, CH05=50

  These vertical channels are *not* set: CH03, CH06 through CH12.

```
SCS Conversion:
   Margins: Top . . . 6__
   Tabs: Vertical . . 20_  0__  40_  50_  ___  (extend)
```

4. On the Processing panel, optionally specify the following PCL conversion values:

- **Print density** field: Specify the number of characters per inch. Valid values are 1-255. The default is the PCL Pitch command or Horizontal Motion Index command specified in the **Document header** field or, if none is specified, the value set on the printer's control panel.
- **Line density** field: Specify the number of lines per inch. Valid values are 1-72. The default is the PCL Line Spacing command or Vertical Motion Index

command specified in the **Document header** field or, if none is specified, the value set on the printer's control panel.

- **Orientation** field: Select one of the following options. **None** is the default.

  – **None:** NetSpool does not specify the PCL page orientation. The PCL Logical Page Orientation command specified in the IP PrintWay **Document header** field or the orientation set at the printer is used.

  – **Portrait:** Lines are printed parallel to the paper's short edge.

  – **Landscape:** Lines are printed parallel to the paper's long edge.

- **SCS automatic page orientation** field: Select this field if you want NetSpool to automatically determine the orientation (portrait or landscape) of each page. NetSpool ignores this field for 3270 data streams.

  Guideline: If you select this field, also specify values in the **Print density**, **Line density**, **Line length**, and **Page length** fields.

5. On the IP PrintWay Options panel:

- Select any IP PrintWay formatting option, because IP PrintWay ignores the IP PrintWay **Formatting** field if NetSpool has already converted data to PCL.

- Optionally, specify PCL commands in the **Document header** and **Document trailer** fields.

  Guidelines:

  a. You might want to select a font in the **Document header** field. See "Selecting a Font" on page 137 for more information.

  b. If you specify PCL commands in the **Document header** field, (1) specify PCL and PJL reset commands *before* any other PCL commands in the **Document header** field and also (2) specify PCL and PJL reset commands in the **Document trailer** field. This is because NetSpool does *not* reset the printer to its original status when you specify your own PCL commands in the **Document header** field.

  Specify the following PCL 5 commands to reset the printer to its original status:

  ```
  Document header  . . <ESC>%-12345X<ESC>E                                  (extend)
      / Translate document header
  Document trailer . . <ESC>E<ESC>%-12345X                                  (extend)
      / Translate document trailer
  ```

  where:

Command	Meaning
<ESC>%-12345X	Resets the printer and enters PJL mode.
<ESC>E	Resets the printer.

  You can also choose to leave the **Document header** field and **Document trailer** fields blank. If you leave these fields blank, NetSpool automatically generates the necessary PCL commands to reset the printer to its original status both before and after each data set.

Tip: If you need to specify the same fields in more than one printer definition, specify the fields in components. Then, include those components in each printer definition to which the components apply.

Examples

The following examples show how to fill in the ISPF panels for SCS and 3270 input data streams.

Example 1. Converting SCS Data Streams to PCL Data Streams: The following ISPF panel shows how to request that NetSpool convert the input data stream to PCL format.

```
                        NetSpool Options

 Formatting . . . . 3   1. None  2. Convert to line  3. Convert to PCL

 .
 .
 .
```

The following ISPF panel shows how to specify code pages and other formatting values.

```
                            Processing
 .
 .
 .

Document code page . . _____
Printer code page. . . ISO8859-1_____

 .
 .
 .
 SCS Conversion:
    Margins:  Top . . . 6__    Bottom . . 61_   Left . . 3__    Right . . 75_
    Line length . . . . 80_              Page length . . 66_
    Tabs:  Vertical . . ___  ___  ___  ___   (extend)
           Horizontal . 5__  10_  15_  20_  ___  (extend)

 NetSpool PCL Conversion:
    Print density . . . 10_
    Line density. . . . 6__
    Orientation . . . . 1 1. None  2. Portrait  3. Landscape
    / SCS automatic page orientation

 .
 .
 .
```

Example 2. Converting 3270 Data Streams to PCL Data Streams: The following ISPF panels shows how to request that NetSpool convert input data streams to PCL data streams.

```
                        NetSpool Options

 Formatting . . . . 3   1. None  2. Convert to line  3. Convert to PCL

 .
 .
 .
```

The following ISPF panel shows how to specify code pages and other formatting values.

```
                        Processing
  ⋮
Document code page . . _____
Printer code page. . . ISO8859-1

  ⋮

 NetSpool PCL Conversion:
    Print density . . . 10
    Line density. . . . 6
    Orientation . . . . 2  1. None  2. Portrait  3. Landscape

  ⋮
```

Selecting No Data Stream Conversion

In each printer definition, you can select a NetSpool formatting option. The formatting option controls how NetSpool formats the data streams created by your VTAM applications. You can select one of the following formatting options:

- Convert to line (default)
- Convert to PCL
- None

This section describes the **None** formatting option. When you select the **None** option, NetSpool does not inspect or convert the input data streams; instead, NetSpool writes input data streams unchanged to the JES spool.

You can select the **None** option when your VTAM applications create output data that the printer can accept without change, for example, if you have VTAM applications that generate ASCII PCL or PostScript data.

When you select the **None** option, NetSpool writes data to the JES spool in variable-length, blocked records, with a maximum record size of 32752. You can select a different record format and change the maximum record size in the printer definition.

When you select the **None** option, NetSpool does not call any exits.

Procedure for Specifying Attributes

Follow these steps to request that NetSpool not convert the input data stream:

1. On the NetSpool Options panel, specify these fields:
    - **Formatting** field: Select the **None** option.
    - **Maximum record size** field: Optionally, specify the maximum size of the variable-length records. Allowed values are 1- 32752; the default value is 32752.
    - **RECFM** field: Select one of the following record formats:
        - VB: variable blocked (default)
        - VBA: variable blocked with ANSI carriage controls
        - VBM: variable blocked with machine carriage controls
2. If the printer is controlled by IP PrintWay, on the IP PrintWay Options panel, specify:
    - **Formatting** field: Select **None** if you do not want IP PrintWay to convert data to ASCII or perform any page formatting.

> **Tip:** If you need to specify the same fields in more than one printer definition, specify the fields in components. Then, include those components in each printer definition to which the components apply.

Example
The following ISPF panel shows how to request no NetSpool formatting and also specify the record size and record format of the output data set:

```
                              NetSpool Options

Formatting . . . . 1   1. None  2. Convert to line  3. Convert to PCL
   Record size . . 80
   RECFM . . . . . 1     1. VB  2. VBA  3. VBM
```

Selecting a Font

NetSpool assumes a fixed-pitch font when it formats data; therefore, you should use a fixed-pitch font to print the data in order to maintain the correct alignment of characters. If you select the **Convert to PCL** formatting option, you should use a fixed-pitch, scalable font to print the data.

If the printer's default font is not suitable, you can specify a font using one of the following methods. The method you use depends on whether the printer is controlled by IP PrintWay or PSF:

- **Printers controlled by PSF for OS/390:** Name the font in the **Character sets** field on the Allocation panel of the printer definition.
- **Printers controlled by IP PrintWay:** You can specify a font in one of the following places:
  - Specify PCL commands to select the font in the IP PrintWay **Document header** field in the printer definition. IP PrintWay sends the PCL commands in this field to the printer; therefore, this font is used to print all data sets transmitted to the printer, not only data sets created by NetSpool.
  - Specify PCL commands to select the font in the NetSpool Beginning of File exit. This font is used to print all data sets created by NetSpool.
  - Name the font in the **Character sets** field on the Allocation panel of the printer definition. Use this method if you (1) use the AFP to PCL or AFP to PostScript transform or (2) print to a remote system running PSF, such as Infoprint Manager. Otherwise, the font you specify in this field is ignored.

Guidelines:
1. If a fixed-pitch font is not suitable for all of your print jobs, you could set up more than one printer definition for the same printer. Then, specify a fixed-pitch font in the printer definition that NetSpool uses.
2. PCL commands in the NetSpool Beginning of File exit override PCL commands in the **Document header** field.
3. If you use the AFP to PCL or the AFP to PostScript transform, do *not* specify a PCL command in the NetSpool Beginning of File exit because the AFP to PCL and AFP to PostScript transforms cannot interpret PCL commands.
4. If you select the **SCS automatic page orientation** field, specify the size of the font in the **Line density** and **Print density** fields instead of in a PCL command so that NetSpool can accurately determine the appropriate page orientation. This is because NetSpool cannot detect the size of a font specified in a PCL command or in the **Character sets** field.

Procedure for Specifying Attributes

Follow these steps to fill in ISPF panels to specify a fixed-pitch font:

- If the printer is controlled by PSF, name the font in the **Character sets** field on the Allocation panel.
- If the printer is controlled by IP PrintWay, and IP PrintWay uses the AFP to PCL transform or the AFP to PostScript transform for line data, name the font in the **Character sets** field on the Allocation panel.
- If the printer is controlled by IP PrintWay, and IP PrintWay does not use a transform for line data, specify PCL commands to select the font in the **Document header** field on the IP PrintWay Options panel. Also, be sure to reset the printer to its original state in the **Document trailer** field.

Tip: If you need to specify the same fields in more than one printer definition, specify the fields in components. Then, include those components in each printer definition to which the components apply.

Examples

Example 1. Specifying a fixed-pitch font for a printer controlled by PSF: The following example shows how to fill in the ISPF panels to specify a fixed-pitch font for a printer controlled by PSF for OS/390. Also, use this example if the printer definition is controlled by IP PrintWay and IP PrintWay uses the AFP to PCL or the AFP to PostScript transform.

```
                            Allocation
 ⋮
Resource Related Values:

 ⋮

    Character sets  . 60DB    ____    ____   ____

 ⋮
```

In this example, PSF, the AFP to PCL transform, and the AFP to PostScript transform use the Gothic Text Latin1, fixed-pitch, font. The pitch is 10 characters per inch.

Example 2. Specifying a Fixed-Pitch Font for a Printer Controlled by IP PrintWay: This example shows how to fill in the ISPF panels to specify PCL commands to select a fixed-pitch font to print the data and then reset the printer to its default settings.

```
                        IP PrintWay Options

 ⋮
 Document header  . . <ESC>%-12345X<ESC>E<ESC>(8U<esc>(s0p10h0s3b4102T      (extend)
    / Translate document header
 Document trailer . . <ESC>E<ESC>%-12345X                                   (extend)
    / Translate document trailer

 ⋮
```

The PCL commands in the **Document header** field reset the printer to its default settings and then select the fixed-pitch Letter Gothic font. The PCL commands shown have the following meaning:

Command   **Meaning**

<ESC>%-12345X	Reset the printer and enter PJL mode.
<ESC>E	Reset the printer.
<ESC>(8U	Select the Roman-8 symbol set.
<ESC>(s0p10h0s3b4102T	Set fixed spacing (0p), 10 characters per inch (10h), upright style (0s), bold weight (3b) , and Letter Gothic typeface (4102T).

Notes:

1. The last letter of each command is a capital letter to denote the end of the command.
2. When you select the NetSpool **Convert to PCL** formatting option, the value in the **Print density** field overrides the number of characters per inch set in the **Document header** field

Specifying How NetSpool Determines End-of-File

To guarantee that data that belongs together actually gets printed in the correct order, NetSpool writes data that belongs together to a single output data set on the JES spool. For printing in the SNA network, the concept of a data set is not needed because an application starting a session with a printer gains exclusive control of that printer for the duration of the session. In contrast, when printing in a JES environment, the sending application is not guaranteed exclusive control of the printer. Between two successive data sets from one application, data sets from other applications might print. If the first attempt to print a data set fails, and a later retry succeeds, two successive data sets from the same application could even be printed in reverse order.

To create an output data set, NetSpool must determine where one data set should end and the next one should begin. You specify the rules that NetSpool uses to make this determination. You can specify different rules for different combinations of VTAM primary logical unit (PLU) names and LU types. The PLU name identifies the VTAM application that sends data to NetSpool.

The rules generally use information found in the input data stream to determine when to end the current output data set. VTAM request unit (RU) chaining information can be used, a string within the input data stream can be used, or even a timer can be used. Work with the application programmers in your installation to determine the appropriate end-of-file rules for each printer definition.

Note: If you edit end-of-file rules in a printer definition while VTAM sessions with the printer LU are active, you must restart the active sessions from your VTAM application, such as CICS and IMS, to pick up the changes.

End-of-File Rules

Print data for a logical printer is received as a stream of VTAM request units (RUs). The SNA architecture defines two groupings of RUs that are of interest:
- A *chain* consists of one or more RUs.
- A *bracket* consists of all of the RUs in one or more related chains.

From an SNA-theory point of view, the use of brackets is the most logical way to determine data-set boundaries. Using this technique, a request marked BB (Begin Bracket) indicates the start of a new data set, and the end of a chain marked EB (End Bracket) marks the end of the data set. This is the default end-of-file rule that NetSpool uses unless you change it. It is called the end-of-bracket rule.

The end-of-bracket rule works with both CICS and IMS LU type 1 sessions, with CICS LU type 3 sessions, and with other applications able to control the use of the BB and EB bracket bits. However, for some applications, the end-of-bracket rule does *not* work well, as indicated by the following examples:

1. In a CICS application with an LU type 0 session:
   - BB is sent on the session's first request.
   - No EB is sent at the end of the transaction.
   - Result: The output for the entire session is treated as one data set, causing a potentially long delay in printing.

2. In an IMS application with a non-SNA 3270 printer:
   - Each line of output is sent as a separate chain marked BB, EB.
   - Result: Each line is treated as a separate data set, causing unnecessary overhead and increasing the chances of data sets from other applications intruding.

NetSpool lets you specify five different end-of-file rules. NetSpool uses only one of these rules for any one session:

- **End-of-bracket (default):** NetSpool ends the data set when the RU chain is marked EB (End Bracket) and starts a new data set when a request unit (RU) is marked BB (Begin Bracket).
- **End-of-session:** NetSpool ends the data set at the end of the VTAM session for this printer definition.
- **End-of-chain:** NetSpool ends the data set at the end of a chain.
- **String:** NetSpool ends the data set when the last RU in a chain contains a specified string of data. You can also specify whether NetSpool is to keep or delete the specified string of data in the output data set.
- **Timer:** NetSpool ends the data set when the time interval specified in either the **Timeout idle interval** field or the **Busy interval** field expires and NetSpool has received the last RU in the chain.

  The **Timer idle interval** field specifies the amount of time NetSpool waits for input data before printing the data already received. If NetSpool does not receive any input data during this time and a reasonable stopping point has been reached (end of an RU chain), NetSpool closes the output data set so it can be printed.

  The **Busy interval** field specifies the amount of time for which NetSpool receives data without printing it. After this time interval expires, NetSpool closes the output data set when a reasonable stopping point is reached (end of an RU chain and the top of a new page).

  Use the timer method only when none of the other end-of-file rules makes sense because:
  - The use of timers to detect data-set boundaries is an inexact method. Tuning is required to choose the best timer values, and even then the results are inexact.
  - Under each of the other end-of-file rules, exact data-set boundaries can be determined directly from the received print data requests.

  The following rules apply when you select the **Timer** option:
  - Specify this option only for LU types 0 and 3.
  - Do *not* select this option when you select the **None** formatting option on the NetSpool Options panel.

Delete Form-Feed Option

When you specify an end-of-file rule, you can also specify whether you want NetSpool to delete form-feed controls that occur in the input data stream before writing the output data set on the JES spool. Deleting form-feed controls lets you remove blank pages that might print before or after the data. You can specify which form-feed controls NetSpool is to delete, as follows:

- Leading form-feed controls: NetSpool deletes the form-feed control at the beginning of the output data set.
- Trailing form-feed controls: NetSpool deletes the form-feed control at the end of the output data set.
- Both leading and trailing form-feed controls: NetSpool deletes the form-feed control both at the beginning and the end of the output data set.

The following considerations apply when you delete trailing form-feed controls:

- For LU type 1 sessions, the form-feed control in the last RU is deleted. If the end-of-session rule is selected, form-feed controls at the end of a data set are not deleted.
- For LU types 0 and 3 sessions, the form-feed control in the page built by the last RU chain is deleted. However, for LU type 3, if the end-of-bracket rule is selected and the RU that ends the bracket is a null single element chain, the form-feed control from the prior chain is deleted.

Procedure for Specifying Attributes

You only need to specify an end-of-file rule and a form-feed option if the defaults are not suitable. By default, NetSpool uses the end-of-bracket rule to determine end of file and does not delete any form-feed controls.

In the NetSpool End-of-File section of the printer definition, you can specify either default rules or specific rules for different primary logical unit (PLU) names:

- A default rule can apply either to all LU types (LU type 0, LU type 1, and LU type 3) or to a specific LU type. NetSpool uses a default rule only if you do not specify another rule for the PLU name and LU type being processed.
- A rule for a specific PLU name or PLU name pattern can apply either to all LU types (LU type 0, LU type 1, and LU type 3) or to a specific LU type. The order in which you type the PLU names on the ISPF panel can be important because NetSpool uses the first rule that applies to the PLU name and LU type being processed.

  A PLU pattern must contain the following characters:
  - At least one letter or number.
  - Either asterisks (*) or question marks (?) but not both:
    - An asterisk represents any number of characters at the start or end of a PLU name. Do not type an asterisk in the middle of a pattern.
    - A question mark represents exactly one character. Type a question mark anywhere in the pattern.

  For example, these are valid name patterns: IMS*, ??XYZ???

Although you can specify more than one end-of-file rule in the NetSpool End-of-File section, NetSpool uses only one rule for each VTAM session.

Tip: If the same end-of-file rules and form-feed options are used by more than one NetSpool printer LU, specify the attributes in an NetSpool End-of-File

component. Then, include that component in the printer definitions for the NetSpool printer LUs to which the rules apply.

Example
The following two ISPF panels show how to specify an end-of-file rule in the NetSpool End-of-File section of a printer definition.

On the NetSpool End-of-File Rules panel, you must indicate whether you want to specify a default end-of-file rule or an end-of-file rule for a specific PLU name or PLU name pattern. In this example, a PLU name pattern, IMS*, is specified. This means that NetSpool uses the end-of-file rule that you specify on the next panel for all PLU names that start with IMS. Because option 5 is selected, the end-of-file rule that you specify on the next panel applies to all LU types with the PLU name pattern, including types 0, 1, and 3.

```
                      NetSpool End-of-File Rules
  Option ===> 5
  Default rules       1 All LUs    2 LU0    3 LU1    4 LU3

  PLU name IMS*        5 All LUs    6 LU0    7 LU1    8 LU3
  PLU name _____    9 All LUs   10 LU0   11 LU1   12 LU3
  PLU name _____   13 All LUs   14 LU0   15 LU1   16 LU3
  PLU name _____   17 All LUs   18 LU0   19 LU1   20 LU3
  PLU name _____   21 All LUs   22 LU0   23 LU1   24 LU3
  PLU name _____   25 All LUs   26 LU0   27 LU1   28 LU3
  PLU name _____   29 All LUs   30 LU0   31 LU1   32 LU3
  PLU name _____   33 All LUs   34 LU0   35 LU1   36 LU3

  :
```

The NetSpool End of File Rule panel is displayed when you press the Enter key on the first panel. On this panel you must select the end-of-file rule. In this example, the following options are selected:

- **String** option: When NetSpool finds X'FF' in the input data stream, NetSpool ends the data set on the JES spool and starts a new one.
- **Keep** option: NetSpool writes X'FF' to the output data set.
- **Delete form feed** option 1: NetSpool does not delete any form-feed controls in the output data set.

```
                      NetSpool End of File Rule

  End of file method . 4  1. End of bracket  2. End of chain  3. End of session
                          4. String          5. Timer
  Delete form feed . . 1  1. None  2. Leading  3. Trailing  4. Both

  String . x'FF'
    / Keep

  Timeout idle interval . . _____    Busy interval . . _____
```

Broadcasting Data Using Multiple Printer Definitions

NetSpool lets users broadcast the same data to mutiple printers or e-mail destinations at the same time. NetSpool formats the data one time and allocates separate output data sets on the JES spool for each printer or e-mail destination.

To broadcast data, you must create three types of objects in the Printer Inventory:

1. A printer definition for each destination. The destination can be a printer or an e-mail address list. If you have already created a printer definition for the destination, you do not need to create a new one.
2. A NetSpool End-of-File component that contains the end-of-file rules NetSpool is to use. If you want to use the default end-of-file rule (end-of-bracket), you do not need to create a component.
3. A printer pool definition. In this definition, you specify the printer LU name that VTAM applications use as the secondary LU name when printing to this pool of printers or e-mail destinations. Also, you select the printer definitions you created in step 1 and, optionally, the NetSpool End-of-File component you created in step 2.

The printer definition that you list first in the printer pool definition must specify the attributes that NetSpool uses to format data. NetSpool formats the data only once and writes the same data in each data set it allocates on the JES spool.

Procedure for Specifying Attributes

In the printer definitions that you plan to list in the printer pool definition, specify:

- **NetSpool LU name** field: Specify this field only if your VTAM applications need to print directly to this printer definition. Leave this field blank if you simply want to list this printer in the printer pool definition; instead, specify the secondary LU name that your VTAM applications use in the **LU name** field in the printer pool definition.
- On the Allocation panel, specify the fields required to allocate output data sets on the JES spool. See "Specifying JES Allocation Parameters" on page 123 for more information.

In one of the printer definitions, specify the following attributes if the default values are not appropriate. List this printer definition *first* in the printer pool definition.

- On the Processing panel:
  - All fields under the **SCS Conversion** heading.
  - All fields under the **NetSpool PCL Conversion** heading.
- On the NetSpool Options panel: All fields.
- On the Allocation panel: **SEGMENT** field and **HOLD** field. NetSpool uses these fields only in the first printer definition listed in the printer pool definition.

In the printer pool definition, on the Printer Pool panel, specify the following fields:

- **Pool name**: Specify a name for the printer pool definition. This name can be the same as the NetSpool printer LU name.
- **LU name**: Specify the NetSpool printer LU name; see "Specifying the NetSpool Printer LU Name" on page 122 for more information.
- **Description**: Optionally specify a description to help you manage your printer pool definitions.
- **LU classes**: Specify the LU classes for the printer LU name if the default is not appropriate; see "Grouping NetSpool Printer LUs into LU Classes" on page 122 for more information.
- **NetSpool end-of-file component**: Specify the name of a component if the default end-of-file rule is not appropriate; see "Specifying How NetSpool Determines End-of-File" on page 139 for more information.
- **Printer definition names**: Select the printer definitions to which you want to broadcast data from a list that you can display. (Place your cursor on this field and press Enter.)

> **Note:** Select first the printer definition in which you specified the attributes you want NetSpool to use when formatting the data.

Example
The following ISPF panel shows how to create a printer pool definition.

```
                          Printer Pool

  Pool name . .  ludept01_____
  LU name . . .  LUDEPT01
  Description .  All department 001 printers_____  (extend)
  LU classes. .  2_  __  __  __  __  __       (extend)
  NetSpool end-of-file component . . eof1_____      (list)

  Printer definition names . . printer1_____   printer2_____   (list)
                _____   _____   _____
                _____   _____   _____
                _____   _____   _____
                _____   _____   _____
```

When a VTAM application prints to LU name LUDEPT01, NetSpool uses the
end-of-file rules specified in NetSpool end-of-file component named **eof1** and the
formats the input data stream using attributes specified in printer definition **printer1**.
NetSpool uses the attributes in the Allocation sections of printer definitions named
printer1 and **printer2** to create two output data sets on the JES spool.

Chapter 13. Planning Printer Definitions for IP PrintWay

Before using IP PrintWay to send print output to remote printers or to e-mail destinations, you must create a printer definition for each target printer and for each e-mail destination. In the printer definition, you can specify printer attributes that IP PrintWay uses to format data in the output data set and transmit data sets to the printer. Table 35 on page 369 summarizes the printer attributes that IP PrintWay uses and indicates whether the attributes are required or optional.

When printing to printers that support the LPR or direct-sockets printing protocol, job submitters can specify the IP address of the printer on the OUTPUT JCL statement and, for the LPR protocol only, in Infoprint Server job attributes; therefore, for these printers, you do not need to create a printer definition for each printer. See "Selecting the LPR Protocol" on page 146 and "Selecting the Direct Sockets Protocol" on page 149 for more information.

After you specify the printer attributes used by IP PrintWay, a job submitter can print from batch applications using JCL. Before a job submitter can print from VTAM applications using NetSpool or from local and remote systems using Print Interface, you might need to specify additional attributes in the printer definition. See Chapter 12, "Planning Printer and Printer Pool Definitions for NetSpool" on page 121 and Chapter 11, "Planning Printer Definitions for Print Interface" on page 93 for information about these attributes.

You can create and edit IP PrintWay printer definitions before starting IP PrintWay or while IP PrintWay is running. If you create or edit a printer definition while IP PrintWay is running, IP PrintWay uses the new attributes the next time IP PrintWay selects a data set from the JES spool for that printer definition; current jobs are not affected.

This chapter describes how to specify printer attributes in the printer definition to accomplish the following tasks; some of the tasks apply only to the indicated IP PrintWay transmission protocol.

Task	Task Applies to Protocol					See Page:
	LPR	Direct Sockets	IPP	VTAM	E-mail	
Selecting the LPR Protocol	Yes	No	No	No	No	146
Selecting the Direct Sockets Protocol	No	Yes	No	No	No	149
Selecting the IPP Protocol	No	No	Yes	No	No	151
Selecting the VTAM Protocol	No	No	No	Yes	No	152
Selecting the E-mail Protocol	No	No	No	No	Yes	156
Specifying Attributes for Allocation	Yes	Yes	Yes	Yes	Yes	166
Using DEST, CLASS, and FORMS to Select a Printer Definition	Yes	Yes	Yes	Yes	Yes	167
Handling Unsuccessful Data Transmissions	Yes	Yes	Yes	Yes	Yes	170
Retaining Data Sets on the JES Spool	Yes	Yes	Yes	Yes	Yes	173

Task	Task Applies to Protocol					See Page:
	LPR	Direct Sockets	IPP	VTAM	E-mail	
Transmitting Multiple Data Sets in a JES2 Output Group	Yes	Yes	Yes	Yes	Yes	174
Converting Between EBCDIC and ASCII	Yes	Yes	Yes	Yes	Yes	176
Converting Line Data to a Text Data Stream	Yes	Yes	Yes	No	Yes	179
Converting Line Data to an SCS or DSC/DSE Data Stream	No	No	No	Yes	No	181
Using an FCB to Format Data	Yes	Yes	Yes	Yes	Yes	183
Printing Data Without Formatting	Yes	Yes	Yes	No	Yes	185
Sending Instructions to the Printer	Yes	Yes	Yes	Yes	Yes	186
Formatting for PostScript Landscape Orientation	Yes	Yes	Yes	No	No	189
Validating That Documents Can Print as Requested	Yes	Yes	Yes	No	Yes	190
Resubmitting Documents to Print Interface for Filtering	Yes	Yes	Yes	No	Yes	191
Printing with Infoprint Manager for AIX or Windows NT	Yes	No	No	No	No	197
Creating an IP PrintWay Default Printer Definition	Yes	Yes	No	No	No	198
Creating Components for Use With the PRTOPTNS JCL Parameter	Yes	Yes	Yes	Yes	Yes	199

Note: This chapter contains planning information only. For detailed information about each field, (such as values you can specify, restrictions, and examples), use the online help for each field on the Infoprint Server ISPF panels.

Selecting the LPR Protocol

In an IP PrintWay printer definition, you can select the transmission protocol that IP PrintWay uses to transmit output data sets from the JES spool to the target system. The target system can be a printer, a print server, or an e-mail destination. IP PrintWay supports these protocols: LPR, direct sockets, IPP, VTAM, and e-mail.

Select the IP PrintWay LPR protocol if you want IP PrintWay to transmit data sets to the target printer using the TCP/IP LPR protocol defined by RFC 1179. When IP PrintWay uses this protocol, an LPD that adheres to RFC 1179 must be running in the remote printer or print server.

When you select the LPR protocol, IP PrintWay transmits data to the LPD at the IP address (or host name) and print queue name that you specify in the printer definition. A job submitter can override the IP address and print queue name specified in the printer definition by specifying the IP address on the OUTPUT JCL statement or in an Infoprint Server job attribute.

Because the job submitter can override the IP address, you can create one printer definition for several printers that share the same attributes. To use this printer definition, the job submitter must specify the name of the printer definition, the IP address, and the print queue name on the OUTPUT JCL statement or in Infoprint Server job attributes. If the job submitter does not specify the name of the printer definition on an OUTPUT JCL statement, then IP PrintWay uses printer attributes specified in the default IP PrintWay printer definition described in "Creating an IP PrintWay Default Printer Definition" on page 198. Refer to *z/OS Infoprint Server User's Guide* for more information about job submission.

When you select the LPR protocol, IP PrintWay also transmits a control file for each data set to the LPD. In the printer definition, you can specify whether you want IP PrintWay to transmit the control file before or after the data set. IP PrintWay converts some attributes that you specify in the printer definition to control codes in this control file. In addition, in the printer definition, you can specify any other control codes that the LPD accepts.

By default, IP PrintWay prints multiple copies of a data set by transmitting the data set to the printer multiple times. Some LPDs, however, can print multiple copies when IP PrintWay transmits the data set to the printer only one time. If your printer supports printing multiple copies of the same data set, you can select the **Optimize copies** option in the printer definition to improve performance. To determine if your printer supports printing multiple copies of the same data set, select the **Optimize copies** field and submit a print request with multiple copies. If your printer prints only one copy, deselect this option.

Related Customization Tasks: The following IP PrintWay customization tasks are related to the LPR protocol. For information about how to perform these tasks and other customization tasks related to the LPR protocol, refer to chapter "Customizing IP PrintWay" in *z/OS Infoprint Server Customization*.

*   Customize the TCP/IP component of z/OS Communications Server.
*   When you select the LPR protocol, IP PrintWay writes the data set to hiperspace. If necessary, increase the amount of available hiperspace in the IP PrintWay FSS definition in the Printer Inventory.

Procedure for Specifying Attributes

1. On the Choose a Definition Type and Protocol panel, select **IP PrintWay LPR**. If you copy a printer definition, select an IP PrintWay printer definition that uses the LPR protocol.
2. On the LPR Protocol panel, specify the following fields:
    *   **IP address**: Specify the IP address or host name of the target printer or print server.
    *   **Print queue name**: Specify the name of the target print queue.
    *   **Mode**: Select one of these options:
        –   **Control file first**: IP PrintWay transmits the control file before the data file. Not all LPDs support this mode; however, this mode allows some LPDs to print data as it is received and print larger files.
        –   **Control file last**: IP PrintWay transmits the control file after the data file. All LPDs that adhere to RFC 1179 support this mode (default).
        –   **Stream**: IP PrintWay transmits the control file before the data file. The remote LPD must support the RECEIVE CONTROL FILE FIRST and RECEIVE DATA FILE WITH UNSPECIFIED LENGTH commands. Select this mode if the target system is an IBM network station.

– **Remote PSF**: IP PrintWay transmits files to Infoprint Manager. See "Printing with Infoprint Manager for AIX or Windows NT" on page 197 for more information about this option.

- **Optimize copies**: Select this field if the printer's LPD can print multiple copies of the same data set.
- **Restrict ports**: Select this field to restrict the z/OS ports that IP PrintWay uses to the range of 721 to 731. Select this option if the printer's LPD requires that IP PrintWay restrict itself to ports in this range. When you do not select the **Restrict Ports** field, IP PrintWay can use any free port; this increases the probability of finding an available port.
- **Print banner page**, **Banner class**, **Banner job name**, **Filename**, **Indent**, **Owner**, **Print function**, **Title**, and **Width**: Optionally, specify values that IP PrintWay transmits to the printer in the LPD control file. See the ISPF online help panels for a description of these fields and the default values.

  Note: Although IP PrintWay transmits these values to the LPD, the LPD might not support them. For example, the LPD might not support printing a banner page or indenting data.

- **User options**: Optionally specify control codes that are supported by the LPD. IP PrintWay adds these control codes to the end of the LPD control file.

3. On the IP PrintWay Options panel, you might need to specify a printer command in the **Document header** or **Document trailer** field to force the printer to start each copy on a new sheet of paper. See "Sending Instructions to the Printer" on page 186 for more information.

Example
The following ISPF panels show how to specify the LPR protocol in a printer definition.

Tip: This example shows only some of the ISPF panels that comprise a printer definition. See Appendix D, "Sample IP PrintWay Printer Definitions" on page 389 for a complete printer definition that is suitable for the LPR protocol.

The Choose a Definition Type and Protocol panel lets you select the protocol type when you use the Add function to create a printer definition.

```
                 Choose a Definition Type and Protocol
  Option ===> 1
    Type           Protocol
  1 IP PrintWay    LPR
  2 IP PrintWay    direct sockets
  3 IP PrintWay    IPP
  4 IP PrintWay    VTAM
  5 IP PrintWay    e-mail
  6 PSF for OS/390
  7 General
```

To display the following LPR Protocol panel, press Enter on the **Custom values** field for the Protocol section on the main panel for the printer definition.

```
                            LPR Protocol

  Printer definition name . myprinter_____

  Printer IP address . printer1.boulder_____ (extend)
  Print queue name . . text_____ (extend)

  LPR Processing Options:
     Mode . . . . . . . . 2  1. Control file first  2. Control file last
                             3. Stream              4. Remote PSF
     _  Optimize copies
     _  Restrict ports
     /  Print banner page
        Banner class. .  Department 001, Building 003_____
        Banner job name _____ (extend)
     Filename . . . . . . _____
     Indent . . . . . . . _____
     Owner. . . . . . . . _____
     Print function . . . _
     Title. . . . . . . . _____ (extend)
     Width. . . . . . . . _____
     User options . . . . _____ (extend)
```

Results:

- IP PrintWay uses the LPR protocol to transmit data sets to print queue `text` at IP address `printer1.boulder`. Because the **Restrict ports** field is not selected, IP PrintWay lets TCP/IP select any available port on the z/OS system to transmit data.

- Because **Control file last** is selected in the **Mode** field, IP PrintWay transmits the control file to the LPD after the data file.

- IP PrintWay also transmits the text specified in the **Banner class** field to the LPD in the control file for printing on a banner page, a page that prints before the data set; however, the banner prints only if the LPD can print banner pages.

Selecting the Direct Sockets Protocol

In an IP PrintWay printer definition, you can select the transmission protocol that IP PrintWay uses to transmit output data sets from the JES spool to the target system. The target system can be a printer, a print server, or an e-mail destination. IP PrintWay supports these protocols: LPR, direct sockets, IPP, VTAM, and e-mail.

Select the IP PrintWay direct sockets protocol if you want IP PrintWay to use the TCP/IP direct sockets printing protocol to transmit data sets directly to a designated port on the target system. When you select this protocol, the remote printer or print server must support direct sockets printing.

IP PrintWay transmits data to the printer or print server at the IP address (or host name) and port number that you specify in the printer definition. A job submitter can override the IP address and port number specified in the printer definition by specifying the IP address in the DEST=IP parameter and the port number in the PORTNO parameter on the OUTPUT JCL statement.

Because the job submitter can override the IP address and port number, you can create one printer definition for several printers that share the same attributes. To use this printer definition, the job submitter must specify the name of the printer definition, the IP address, and the port number on the OUTPUT JCL statement. If the job submitter does not specify the name of the printer definition on the OUTPUT JCL statement, then IP PrintWay uses printer attributes specified in the default IP

PrintWay printer definition described in "Creating an IP PrintWay Default Printer Definition" on page 198. Refer to *z/OS Infoprint Server User's Guide* for more information about job submission.

Some printers support the direct sockets printing protocol as well as other protocols, such as the LPR protocol. For large data sets, the direct sockets printing protocol can provide better performance. However, you might want to select the LPR protocol to take advantage of the formatting options that IP PrintWay can specify in the LPD control file, for example, printing a banner page.

IP PrintWay prints multiple copies by transmitting the data set to the printer the requested number of times. This is because the direct sockets printing protocol cannot print multiple copies of a single data set.

Related Customization Tasks: The following IP PrintWay customization tasks are related to the direct sockets protocol. For information about how to perform these tasks and other customization tasks related to the direct sockets protocol, refer to chapter "Customizing IP PrintWay" in *z/OS Infoprint Server Customization*.

- Customize the TCP/IP component of z/OS Communications Server.
- When you either limit the size of the data set (in the **Maximum document size** field) or select the **Delete form feed** option, IP PrintWay writes the data set to hiperspace. If necessary, increase the amount of available hiperspace in the IP PrintWay FSS definition in the Printer Inventory.

Procedure for Specifying Attributes

1. Add a new printer definition. On the Choose a Definition Type and Protocol panel, select **IP PrintWay direct sockets**. If you copy a printer definition, select an IP PrintWay printer definition that uses the direct sockets protocol.
2. On the Direct Sockets Protocol panel, specify the following fields:
   - **IP address**: Specify the IP address or host name of the target printer or print server.
   - **Port number**: Specify the port number at which the printer or print server supports printing.

Example
The following ISPF panels show how to specify the direct sockets protocol in a printer definition.

When you use the Add function to create a new printer definition, the Choose a Definition Type and Protocol panel lets you select the protocol type.

```
                  Choose a Definition Type and Protocol
 Option ===> 2
    Type             Protocol
 1 IP PrintWay      LPR
 2 IP PrintWay      direct sockets
 3 IP PrintWay      IPP
 4 IP PrintWay      VTAM
 5 IP PrintWay      e-mail
 6 PSF for OS/390
 7 General
```

To display the following Direct Sockets Protocol panel, press Enter on the **Custom values** field for the Protocol section on the main panel for the printer definition.

```
                          Direct Sockets Protocol

Printer definition name . myprinter

Printer IP address . 99.999.123.456                                        (extend)
Port number. . . . . 2501
```

> **Result:** IP PrintWay uses the direct sockets protocol to transmit data sets to port
> number 2501 at IP address 99.999.123.456. IP PrintWay transmits only a data file,
> without a control file.

Selecting the IPP Protocol

In an IP PrintWay printer definition, you can select the transmission protocol that IP
PrintWay uses to transmit output data sets from the JES spool to the target system.
The target system can be a printer, a print server, or an e-mail destination. IP
PrintWay supports these protocols: LPR, direct sockets, IPP, VTAM, and e-mail.

Select the IP PrintWay IPP (Internet Printing Protocol) protocol if you want IP
PrintWay to transmit data sets over the Internet to the target printer. When you
select the IPP protocol, an IPP server must be running in the remote printer or host
system.

IP PrintWay transmits the print data stream to the IPP server at the URL that you
specify in the printer definition. A job submitter cannot override the URL when
submitting a print job. This means that you must create one printer definition for
each printer.

Along with the data, IP PrintWay also transmits a control file containing the following
IPP job attributes:
* **copies**
* **document-name**
* **job-name**
* **requesting-user-name**
* **sides**

The IPP server running in the target printer or system processes the IPP job
attributes that IP PrintWay sends with each print request. The IPP server ignores
any IPP job attributes that it does not support. For example, some IPP servers do
not support the **copies** and **sides** attributes, so the output might not print as
requested. If the IPP server ignores one or more of the IPP job attributes for a print
job, a message in the IP PrintWay message log indicates which job attributes were
ignored.

Related Customization Tasks: The following IP PrintWay customization tasks are
related to the IPP protocol. For information about how to perform these tasks and
other customization tasks related to the IPP protocol, refer to chapter ″Customizing
IP PrintWay″ in *z/OS Infoprint Server Customization*.
* If you did not install Infoprint Server files in default directories, specify the
  directories in the STDENV data set in the IP PrintWay startup procedure.
* When you select the IPP protocol, and also either limit the size of the data set (in
  the **Maximum document size** field) or select the **Delete form feed** option, IP
  PrintWay writes the data set to hiperspace. If necessary, increase the amount of
  available hiperspace in the IP PrintWay FSS definition in the Printer Inventory.

Procedure for Specifying Attributes

1. Add a new printer definition. On the Choose a Definition Type and Protocol panel, select **IP PrintWay IPP**. If you copy a printer definition, select an IP PrintWay printer definition that uses the IPP protocol.

2. On the IPP Protocol panel, specify the following fields:

   • **URL**: Specify the uniform resource locator (URL) of the IPP server. Consult your IPP printer or IPP print server documentation for the format of the URL to use. The format of the URL depends on the implementation of the IPP printer or print server and varies among printer manufacturers.

Example

The following ISPF panels show how to specify the IPP protocol in a printer definition.

When you use the Add function to create a printer definition, the Choose a Definition Type and Protocol panel lets you select the protocol type.

```
                    Choose a Definition Type and Protocol
 Option ===> 3
    Type              Protocol
 1 IP PrintWay        LPR
 2 IP PrintWay        direct sockets
 3 IP PrintWay        IPP
 4 IP PrintWay        VTAM
 5 IP PrintWay        e-mail
 6 PSF for OS/390
 7 General
```

To display the following IPP Protocol panel, press Enter on the **Custom values** field for the Protocol section on the main panel for the printer definition.

```
                         IPP Protocol

 Printer definition name . myprinter

 URL. . . . . . . . . http://myhost:631/myprintq                  (extend)
```

Result: IP PrintWay uses the IPP protocol to transmit data sets to an IPP server at URL `http://myhost:631/myprintq`. IP PrintWay transmits the data to port 631.

Selecting the VTAM Protocol

In an IP PrintWay printer definition, you can select the transmission protocol that IP PrintWay uses to transmit output data sets from the JES spool to the target system. The target system can be a printer, a print server, or an e-mail destination. IP PrintWay supports these protocols: LPR, direct sockets, IPP, VTAM, and e-mail.

Select the IP PrintWay VTAM protocol if you want IP PrintWay to transmit data sets to a VTAM-controlled printer. The printer must be defined to VTAM as LU type 0, 1, or 3.

IP PrintWay transmits data sets to the VTAM LU name that you specify in the printer definition. A job submitter cannot specify the LU name of the printer when submitting a print job. Therefore, you must create a printer definition for each VTAM-controlled printer.

Depending on the VTAM LU type, IP PrintWay can convert line data to either the SNA Character String (SCS) or the Data Stream Compatible/Data Stream Extended (DSC/DSE) data stream. The following tables summarizes the supported LU types and data streams:

LU Type	Data Stream
LU type 0	DSC/DSE
LU type 1	SCS
LU type 3	DSC/DSE

IP PrintWay can also transmit data sets to VTAM-controlled printers without changing the data. This support means that you can print data that is already in the format required by your VTAM-controlled printers. For example, you can print PCL data to VTAM-controlled printers that accept PCL data. Optionally, IP PrintWay can transmit the unchanged data as transparent data. This support lets you transmit data through an SNA gateway that requires that data be preceded by transparent data controls. Typically, the SNA gateway removes the transparent data controls before transmitting the data to the printer. For each printer, you can specify the transparent data character that the SNA gateway expects in the transparent data controls. IP PrintWay does *not* transmit the following types of data as transparent data:

- Printer instructions specified in the ″Document header″ and ″Document trailer″ fields
- Data added by the IP PrintWay Begin Data Set and End Data Set exits

Limitations: When you select the VTAM protocol, IP PrintWay does *not* support:
- Double byte character set (DBCS) data
- Printing more than one copy of a data set. IP PrintWay ignores the number of copies requested and always prints one copy.
- For LU1 devices, String Control Byte compression (SCB) or compaction
- The IP PrintWay **translate-only** formatting option.

Related Customization Tasks: The following IP PrintWay customization tasks are related to the VTAM protocol. For information about how to perform these tasks and other customization tasks related to the VTAM protocol, refer to chapter ″Customizing IP PrintWay″ in *z/OS Infoprint Server Customization*.

- Install the Coax Printer Support feature of Infoprint Server Transforms (5697-F51). The Coax Printer Support feature converts line data to either the SCS or DSC/DSE data stream and transmits the data stream to the printer.
- Create a VTAM APPL definition for each IP PrintWay FSS, and specify the APPL name in the IP PrintWay FSS definition. Do *not* specify the APPL name in the FSS definition until you have installed the Coax Printer Support feature.

Creating VTAM Resource Definitions for VTAM-Controlled Printers

You must create the following VTAM resource definitions in addition to the VTAM APPL definition for the IP PrintWay FSS:

- A VTAM logon mode entry definition for each device type; see "VTAM Logon Mode Definitions" on page 154.
- A VTAM resource definition for each target printer; see "VTAM Resource Definitions for Printers" on page 154.
- VTAM cross-domain definitions. These definitions might be required if the VTAM printer resource definitions are owned by another VTAM domain.

Refer to *z/OS Communications Server: SNA Resource Definition Reference* for complete information about how to create these VTAM resource definitions.

VTAM Logon Mode Definitions

A VTAM logon mode definition defines the VTAM session parameters. IP PrintWay does not require any special parameters in the VTAM logon mode definition; therefore, you can use any existing LU0, LU1, and LU3 logon mode definition that is suitable for the type of printer attachment used by the printer. In a VTAM cross-domain system, the logon mode definition must be available to the VTAM domain that owns the printer logical unit.

Entries supplied by IBM in the default logon mode table, ISTINCLM, that would be suitable are:

```
**********************************************************************
*                                                                    *
* DSILGMOD  LOGMODE TABLE FOR BSC,LOCAL,SDLC 3275,3277,3278,3279      *
*           MODEL 2 OR 12, 24 X 80 SCREEN. MAY BE USED TO RUN         *
*              MODELS 3, 4, 5, 2C OR 3C AS MODEL 2                    *
*           ALSO FOR 3284, 3286, 3287, 3288, 3289 PRINTERS           *
*           THROUGH A 3271, 3272, 3274, 3275, OR 3276 CONTROLLER      *
*                                                                    *
**********************************************************************
DSILGMOD MODEENT LOGMODE=DSILGMOD,FMPROF=X'02',TSPROF=X'02',          *
                 PRIPROT=X'71',SECPROT=X'40',COMPROT=X'2000',         *
                 RUSIZES=X'0000',PSERVIC=X'000000000000000000000200',*
                 APPNCOS=#CONNECT

**********************************************************************
*                                                                    *
*      PRINTER WITH SNA CHARACTER SET                                *
*                                                                    *
**********************************************************************
SCS      MODEENT LOGMODE=SCS,FMPROF=X'03',TSPROF=X'03',PRIPROT=X'B1',*
                 SECPROT=X'90',COMPROT=X'3080',RUSIZES=X'87C6',       *
                 PSERVIC=X'01000000E100000000000000',                 *
                 PSNDPAC=X'01',SRCVPAC=X'01',APPNCOS=#CONNECT SCS


**********************************************************************
*                                                                    *
*      PRINTER WITH 4K BUFFER                                        *
*                                                                    *
**********************************************************************
DSC4K    MODEENT LOGMODE=DSC4K,FMPROF=X'03',TSPROF=X'03',PRIPROT=X'B1',*
                 SECPROT=X'90',COMPROT=X'3080',RUSIZES=X'8787',       *
                 PSERVIC=X'03000000000018502B507F00',                 *
                 APPNCOS=#CONNECT
```

VTAM Resource Definitions for Printers

A VTAM resource definition is required for each printer. Some sample VTAM resource definitions are:

```
* Non-SNA,LUTYPE=0
P001  LOCAL CUADDR=nnn,TERM=nnnn,DLOGMOD=DSILGMOD
* SNA,LUTYPE=1
P002  LU    LOCADDR=nnn,DLOGMOD=SCS
* SNA,LUTYPE=3
P003  LU    LOCADDR=nnn,DLOGMOD=DSC4K
```

Note: The DLOGMOD parameter names an entry in the VTAM logmode table. You can also specify the logmode entry name in the **Printer logmode** field of the printer definition.

Procedure for Specifying Attributes

1. Add a printer definition. On the Choose a Definition Type and Protocol panel, select **IP PrintWay VTAM**. When you select the VTAM protocol, a value that is suitable for the VTAM protocol is automatically displayed in the following field:

   - **Printer code page**: The EBCDIC code page specified in the Infoprint Server configuration file, **aopd.conf**, is displayed. For information about how to edit this file, refer to *z/OS Infoprint Server Customization*.

   Instead of adding a new printer definition, you can either copy or change the protocol in an existing printer definition:

   - If you copy a printer definition, select an IP PrintWay printer definition that uses the VTAM protocol.
   - If you change the protocol type of an existing printer definition using the X function on the List Printer Definition panel, also edit the following field on the Processing panel:

     - **Printer code page**: Specify an EBCDIC code page (such as IBM-1047) because most VTAM-controlled printers expect EBCDIC data.

2. On the VTAM Protocol panel, specify the following fields:

   - **Printer LU name**: Specify the VTAM network name of the printer. This name must match the name of the VTAM resource definition, for example the name of the VTAM LU statement or the VTAM LOCAL statement. This field is required.
   - **Printer logmode**: Optionally, specify the name of an entry in the VTAM logon mode table. If this field is blank, the VTAM default is used. The default value is the name specified in the DLOGMOD parameter of the LU or LOCAL definition statement for the printer.
   - **Checkpoint pages**: Optionally, specify the number of pages (0 - 25) between data-set checkpoints. IP PrintWay requests a definitive response from the printer after the specified number of pages. If a recoverable printer error or printer intervention situation occurs, IP PrintWay resends the number of pages sent to the printer since the last definitive response. This ensures that no data is lost; however, duplicate pages might be printed.

     A value of 0 means that IP PrintWay performs no checkpointing. If an error occurs, IP PrintWay retransmits the entire data set to the printer if you have requested retries in the printer definition.

     If you request more frequent checkpoints, printer performance might be adversely affected. If you request less frequent checkpoints, more duplicate pages might be printed. The default value is 5 pages.

   - **Send as transparent data**: Optionally, select this field to send data to the printer as transparent data. IP PrintWay precedes transparent data with a transparent data control that contains a 1-byte transparent data character and a 1-byte length field.

     Tip: When you select the **Send as transparent data** field, IP PrintWay always processes data as if the IP PrintWay **None** formatting option were selected; therefore, if you select this field, it is not necessary to also select the **None** option on the IP PrintWay Options panel.

3. On the Processing panel and the IP PrintWay Options panel, optionally specify the following fields that control how IP PrintWay formats data for the printer:

   - **Transparent data char**: If you select the **Send as transparent data** field, optionally specify the transparent data character that you want IP PrintWay to use in the transparent data control. The default character is X'35'.

Example

The following ISPF panels show how to specify the VTAM protocol in a printer definition.

Tip: This example shows only some of the ISPF panels that comprise a printer definition. See Appendix D, "Sample IP PrintWay Printer Definitions" on page 389 for a complete printer definition that is suitable for the VTAM protocol.

Use the Add function to create a printer definition. On the Choose a Definition Type and Protocol panel, select the protocol type:

```
                     Choose a Definition Type and Protocol
   Option ===> 4
     Type              Protocol
   1 IP PrintWay       LPR
   2 IP PrintWay       direct sockets
   3 IP PrintWay       IPP
   4 IP PrintWay       VTAM
   5 IP PrintWay       e-mail
   6 PSF for OS/390
   7 General
```

To display the following VTAM Protocol panel, press Enter on the **Custom values** field for the Protocol section on the main panel of the printer definition.

```
                            VTAM Protocol

   Printer definition name . myprinter

   Printer LU name. . . P002

   VTAM Processing Options:
      Printer logmode. . . SCS
      Checkpoint pages . . 5
      _ Send as transparent data
```

Results:

- IP PrintWay uses the VTAM protocol to transmit data sets to the printer with VTAM LU name P002.
- IP PrintWay uses the VTAM logon-mode entry named SCS and requests a definitive response from the printer every 5 pages.

Selecting the E-mail Protocol

In an IP PrintWay printer definition, you can select the transmission protocol that IP PrintWay uses to transmit output data sets from the JES spool to the target system. The target system can be a printer, a print server, or an e-mail destination. IP PrintWay supports these protocols: LPR, direct sockets, IPP, VTAM, and e-mail.

Select the IP PrintWay e-mail (electronic mail) protocol if you want IP PrintWay to transmit data sets to one or more e-mail addresses over the Internet using the z/OS UNIX sendmail function provided by z/OS Communications Server.

IP PrintWay transmits e-mails to the e-mail addresses that you specify in the printer definition. The job submitter cannot currently specify e-mail addresses during job submission; therefore, you must create a printer definition for each set of e-mail addresses to which you want to send data.

IP PrintWay provides the following functions when you select the e-mail protocol:

* IP PrintWay can send an output data set to one or more e-mail addresses at the same time.
* You can specify e-mail addresses directly in the printer definition or you can specify the name of an alias that is defined to sendmail. Sendmail expands alias names into one or more real e-mail addresses. See "Defining Aliases to z/OS UNIX Sendmail" on page 159 for information about how to define aliases.
* IP PrintWay sends documents as e-mail attachments. Typically, IP PrintWay creates a *separate* e-mail for each data set; however, in the printer definition, you can request that IP PrintWay send data sets that are in the same JES2 output subgroup as individual attachments in the *same* e-mail.
* Data in attachments can be in any format, including PDF, text, and AFP format. In the printer definition, you can request that Print Interface transform input data from one format to another before IP PrintWay creates the attachment. For example, if your installation has installed the AFP to PDF transform, a feature of Infoprint Server Transforms, you can transform line or AFP data to PDF format so that it can be viewed with the Adobe Acrobat Reader. For information about how to request a transform, see "Resubmitting Documents to Print Interface for Filtering" on page 191 and Chapter 14, "Planning Printer Definitions for Infoprint Server Transforms" on page 201.
* Depending on the method used to submit jobs, some job submitters can customize the subject of the e-mail. For those situations in which the job submitter cannot specify a subject, you can specify a default subject line in the printer definition. For example, when you print VTAM application data (such as CICS data) through NetSpool, the job submitter cannot customize the subject line.
* When you print VTAM application data (such as CICS data) through NetSpool, you can print data and also send it to a set of e-mail addresses at the same time. To do this, create a printer pool definition and in the pool definition list the printer definition that specifies the e-mail addresses and also the printer definition for the printer itself. See "Broadcasting Data Using Multiple Printer Definitions" on page 142 for more information.

Table 8 shows how IP PrintWay constructs an e-mail.

Table 8. Fields in an E-mail

For this e-mail field	IP PrintWay uses this value	For example:
Date and time	Current date and time	12/22/2001 12:00:00 AM
Primary recipients	E-mail addresses and sendmail alias names.	To: myname@xyz.com, dept01list@SYSTEM1
Secondary recipients	Not supported.	cc: bcc:
Sender	User ID of job creator@domain of z/OS system.	From: USER1@SYSTEM1

Table 8. Fields in an E-mail (continued)

For this e-mail field	IP PrintWay uses this value	For example:
Subject	Text user specifies in the TITLE JCL parameter, title-text job attribute, or LPR command. If none is specified, either the job name or the title specified in the Allocation section of the printer definition is used. If no title is specified, the job name is used.[1]	Subject: Annual Report for XYZ Corporation
Name of attachment	Last qualifier of the data set name on the JES spool, followed by a suffix to designate the document format.[2]	MYFILE.txt, MYFILE.afp, MYFILE.pdf

1. In the following situations, Infoprint Server generates the job name:
   - If NetSpool allocated the data set on the JES spool, the job name is the member name of the NetSpool startup procedure.
   - If Print Interface allocated the data set on the JES spool, the job name name specified in the **sysout-job-name** job attribute or the user ID of the person who submitted the print request.

2. In the following situations, Infoprint Server generates the data set name:
   - If NetSpool allocated the job on the JES spool, the data set name is the LU name of the VTAM application that submitted the print request (also known as the primary LU name).
   - If Print Interface allocated the job on the JES spool, the data set name is the name specified in the **sysout-dataset-name** job attribute or the last eight characters of the original file name. A # in the name means that the original file name contains a character that JES does not allow in a data set name. For example, if the original file name is myfile.print, this field contains le#print.

   The z/OS system generates a data set name of ? for sysout data sets that do not have another name. If the last qualifier of the data set name is ″?″, then IP PrintWay uses the job name instead of the data set name.

   Job submitters can specify a data set name in the DSNAME parameter on the DD JCL statement or in the **sysout-dataset-name** job attribute. Refer to *z/OS Infoprint Server User's Guide* for information.

   The following suffixes designate the document format:

Suffix	Document format
txt	Text
afp	IBM Advanced Function Presentation (also known as MO:DCA-P)
pcl	Hewlett Packard Printer Control Language
pdf	Adobe Portable Document Format
ps	Adobe PostScript
sap	SAP R/3 Output Text Format (OTF) or ABAP
octet-stream	Unrecognized format

Limitations: The following limitations exist:

- In the following situations, the sender field of the e-mail does *not* contain the e-mail address of the individual who sent the e-mail; therefore, in these cases, the recipient should not reply to the sender:
  - If NetSpool allocated the data set on the JES spool, the sender is the user assigned to the NetSpool started task.

- If Print Interface allocated the data set on the JES spool and the job was submitted from a remote system, the sender is the name of the user on the remote system. However, the domain name is the domain of the system on which sendmail is running, so in most cases, this would not be a valid z/OS e-mail address.

- IP PrintWay cannot always determine whether an e-mail was successfully sent to a recipient. This is because sendmail does not report an error to IP PrintWay when mail could not be delivered to an e-mail address on a remote system. In this case, sendmail returns the undeliverable e-mail to owner of the sendmail alias. If the e-mail address is specified directly in the printer definition, or if no alias owner is defined, sendmail returns undeliverable e-mail to the user ID associated with the IP PrintWay startup procedure. See "Viewing z/OS UNIX Sendmail Messages" on page 64 for more information about sendmail messages.

- IP PrintWay ignores the number of requested copies and always sends only one data set to an e-mail address.

- IP PrintWay cannot add PostScript headers to data sets with line data. If you want to e-mail line data as a PostScript document, use the AFP to PostScript transform, a feature of Infoprint Server Transforms, to convert line data to PostScript format.

Related Customization Tasks: The following IP PrintWay customization tasks are related to the e-mail protocol. For information about how to perform these tasks and other customization tasks related to the e-mail protocol, refer to chapter "Customizing IP PrintWay" in *z/OS Infoprint Server Customization*.

- Configure the z/OS UNIX sendmail component of z/OS Communications Server.

- When you either limit the size of the data set (in the **Maximum document size** field) or select the **Delete form feed** option, IP PrintWay writes the data set to hiperspace. If necessary, increase the amount of available hiperspace in the IP PrintWay FSS definition in the Printer Inventory.

- If you do *not* install Infoprint Server files and z/OS UNIX sendmail in default directories, specify the directories in the STDENV data set in the IP PrintWay startup procedure.

Defining Aliases to z/OS UNIX Sendmail

You can define an alias name to sendmail to represent one or more real e-mail addresses. Sendmail expands alias names into e-mail addresses when it sends an e-mail. After you define an alias to sendmail, you can simply specify the alias name in a printer definition. You might want to define an alias for a mailing list that you need to specify in more than one printer definition or that is longer than the 256 characters you can specify in a printer definition.

Following is a summary of the steps you need to perform to define an alias to sendmail. Refer to *z/OS Communications Server: IP Configuration Guide* for more complete information.

1. In the sendmail aliases file, **/etc/aliases**, specify the alias name and either the real e-mail addresses or the name of a file in which you specify the real addresses. To edit the aliases file, you must have an effective UID of 0.

2. Run the sendmail **newaliases** command so that sendmail recognizes the new aliases.

3. Optionally, create a file in which you specify the real e-mail addresses for the alias. This file must be readable by everyone but writable only by the owner. All directories in its path must be readable by everyone, executable by everyone, and writable only by the owner.

For example, to define two aliases, `dept123` and `dept456`, follow these steps:

1. Switch to an effective UID of 0:

   ```
   su
   ```

   To use the z/OS UNIX **su** command, you must be permitted to the BPX.SUPERUSER profile in the FACILITY class in RACF.

   Then, edit the sendmail aliases file using your preferred editor, for example:

   ```
   oedit /etc/aliases
   ```

   Add the following lines to define the e-mail addresses for alias `dept123` and the name of a file that contains the e-mail addresses for alias `dept456`.

   ```
   #Define an alias and the list of addresses.
   dept123: user1@xyz.com,user2@xyz.com,user3@xyz.com
   # Define an alias and the file that contains the list.
   dept456: "include:/u/myuserid/dept456.list"
   ```

2. Update sendmail so that it recognizes the new aliases:

   ```
   /usr/sbin/newaliases
   ```

3. Create file **/u/myuserid/dept456.list** using your preferred editor, for example:

   ```
   oedit /u/myuserid/dept456.list
   ```

   In this file, specify the e-mail addresses for alias `DEPT456`.

   ```
   user1@xyz.com,user2@xyz.com,user3@xyz.com,user4@xyz.com,
   user5@xyz.com
   ```

   Change the permissions of the file:

   ```
   chmod 755 /u/myuserid/dept456.list
   ```

   Change the permissions of the directory:

   ```
   chmod 755 /u/myuserid
   ```

For more information about the z/OS UNIX commands used in this example, refer to *z/OS UNIX System Services Command Reference*.

Viewing E-mail Attachments

The following table summarizes how e-mail recipients can view e-mail attachments created by IP PrintWay.

The mail servers on AIX systems and on most UNIX systems, including z/OS UNIX, let users view data that is in text format; other data formats such as PDF or PostScript cannot be viewed.

Table 9. Data Formats for E-mail Attachments and Viewers

For this data format:	Use this viewer:
Text	Any text editor such as Windows Notepad.
AFP	The IBM AFP Viewer plug-in for Windows, which you can download from the Web at: http://www.ibm.com/printers/download.html
PDF	The Adobe Acrobat Reader, which you can download from the Adobe Web site. To view PDF data created by the AFP to PDF transform, you might need to customize Acrobat Reader.

Table 9. Data Formats for E-mail Attachments and Viewers (continued)

For this data format:	Use this viewer:
PostScript	Ghostview, which you can download from the Ghostview Web site.

Procedure for Specifying Attributes

You can either create a new printer definition for an e-mail destination or modify an existing printer definition for a printer.

Creating a New Printer Definition

Follow these steps to create a new printer definition for an e-mail destination. These steps describe fields that have special considerations for the e-mail protocol. You might need to specify other fields in the printer definition as well in order to use all the functions provided by Infoprint Server.

1. Use the Infoprint Server ISPF panels to add a new printer definition. On the Choose a Definition Type and Protocol panel, select **IP PrintWay e-mail**.

   When you select the e-mail protocol, values that are suitable for the e-mail protocol are automatically displayed in the following fields on the Processing panel. You can edit these fields if the values are not suitable.

   - **Printer code page**: The EBCDIC code page that is specified in the Infoprint Server configuration file, **aopd.conf**, is displayed in this field because z/OS UNIX sendmail expects EBCDIC data. For information about how to edit this configuration file, refer to *z/OS Infoprint Server Customization*.

   - **Print page header**: This field is deselected because a page header is not typically desired in an e-mail attachment.

2. On the E-mail Protocol panel, in the **E-mail addresses** field, specify the e-mail addresses of the primary recipients. Separate multiple addresses with a comma. You can specify up to 256 characters of data. Each address should be in the format:

   user[*@domainname*]

   where:

   user   The name of the primary recipient or the name of an alias defined to sendmail.

   @domainname
       The domain name of the target system. If you omit *@domainname*, the domain name of the system on which sendmail is running is used. If you specify an alias, omit *@domainname*.

3. On the Allocation panel, specify the following field:

   - **Title:** Optionally, specify a default subject for the e-mail. You can specify up to 60 characters, including blanks and any other printable characters. A title specified by the job submitter overrides this value. This field applies only to data sets that NetSpool or Print Interface allocate on the JES spool, and it is not used for data sets submitted from batch applications.

4. On the Processing panel: Optionally, specify transforms in the **Filter** fields. For example, you might want to specify the AFP to PDF transform (**afp2pdf.dll**) for the **Line data** and **MO:DCA-P** data formats. If you specify this transform, you might need to specify other fields in the printer definition; see "Transforming AFP Data and Line Data to PCL, PDF, and PostScript Format" on page 205 for information. You must also customize the transform as described in *z/OS Infoprint Server Customization*.

5. On the NetSpool Options panel, if your installation prints from VTAM applications such as CICS and IMS, select the **Convert to line** formatting option. This option causes NetSpool to convert SCS and 3270 data to line data instead of to PCL data. IP PrintWay can then convert line data to either text data (default) or to PDF data (using the AFP to PDF transform). Both text data and AFP data can be viewed in an e-mail attachment; however, PCL data cannot be easily viewed.

6. On the IP PrintWay Options panel:

   - Select how you want IP PrintWay to handle data sets that are in the same JES2 output subgroup. Select one of the following values in the **Dataset grouping** field:

     – **None**: IP PrintWay sends each data set as an attachment in a separate e-mail.

     – **Job**: IP PrintWay sends each data set as an attachment in a separate e-mail.

     – **Concatenate job**: IP PrintWay sends each data set in a JES2 output subgroup as an attachment in the same e-mail.

     The **Dataset grouping** field applies only for data sets that JES2 assigns to the same output subgroup. See "Transmitting Multiple Data Sets in a JES2 Output Group" on page 174 for more information about this field.

   - Leave the **Retry time** and **Retry limit** fields blank. Retries are not recommended for the e-mail protocol. See "Handling Unsuccessful Data Transmissions" on page 170 for more information about these fields.

Modifying a Printer Definition

Follow these steps to modify a printer definition that currently represents a printer to send data to an e-mail destination instead.

1. Use the Infoprint Server ISPF panels to list the printer definition you want to modify. On the List Printer Definition panel, use the **X** function. On the Choose a Definition Type and Protocol panel, select **IP PrintWay e-mail**.

2. On the E-mail Protocol panel, in the **E-mail addresses** field, specify the e-mail addresses of the primary recipients. Separate multiple addresses with a comma. You can specify up to 256 characters of data. Each address should be in the format:

   user[*@domainname*]

   where:

   user The name of the primary recipient or the name of an alias defined to sendmail.

   @domainname
     The domain name of the target system. If you omit *@domainname*, the domain name of the system on which sendmail is running is used. If you specify an alias, omit *@domainname*.

3. On the Allocation panel, specify the following fields:

   - **Spool allocation values**: Change these values to specify the JES work-selection values that your system programmer has defined for the IP PrintWay FSA. If the printer definition currently represents an IP PrintWay-controlled printer, no changes are required.

   - **Title:** Optionally, specify a default subject for the e-mail. You can specify up to 60 characters, including blanks and any other printable characters. A title specified by the job submitter overrides this value. This field applies only to

data sets that NetSpool or Print Interface allocate on the JES spool, and it is not used for data sets submitted from batch applications.

4.   On the Processing panel, specify the following fields:

- **Printer code page**: Specify an EBCDIC code page (such as IBM-1047) because sendmail expects EBCDIC data. If the printer definition currently represents an IP PrintWay-controlled printer, the printer code page is probably an ASCII code page.

- **Print page header**: Deselect this field if you do not want a page header on each page of the e-mail attachment.

- **PostScript header**: Remove any selected options so that IP PrintWay does not attempt to add a PostScript header.

- **Filter**: Optionally, specify transforms. For example, you might want to specify the AFP to PDF transform (**afp2pdf.dll**) for the **Line data** and **MO:DCA-P** data formats. If you specify this transform, you might need to specify other fields in the printer definition; see "Transforming AFP Data and Line Data to PCL, PDF, and PostScript Format" on page 205 for information. You must also customize the transform as described in *z/OS Infoprint Server Customization*.

  Remove filter **lpd_compat.so** if it is specified for the **Text** data format.

5.   On the NetSpool Options panel, if your installation prints from VTAM applications such as CICS and IMS, select the **Convert to line** formatting option. This option causes NetSpool to convert SCS and 3270 data to line data instead of to PCL data. IP PrintWay can then convert line data to either text data (default) or to PDF data (using the AFP to PDF transform). Both text data and AFP data can be viewed in an e-mail attachment; however, PCL data cannot be easily viewed.

6.   On the IP PrintWay Options panel:

- Select how you want IP PrintWay to handle data sets that are in the same JES2 output subgroup. Select one of the following values in the **Dataset grouping** field:

  –   **None**: IP PrintWay sends each data set as an attachment in a separate e-mail.

  –   **Job**: IP PrintWay sends each data set as an attachment in a separate e-mail.

  –   **Concatenate job**: IP PrintWay sends each data set in a JES2 output subgroup as an attachment in the same e-mail.

  The **Dataset grouping** field applies only for data sets that JES2 assigns to the same output subgroup. See "Transmitting Multiple Data Sets in a JES2 Output Group" on page 174 for more information about this field.

- Blank out any values specified in the **Retry time** and **Retry limit** fields. Retries are not recommended for the e-mail protocol. See "Handling Unsuccessful Data Transmissions" on page 170 for more information about these fields.

- Blank out any values specified in the **Document header** and **Document trailer** fields. Printer instructions might be displayed as unrecognizable text when the e-mail attachment is viewed.

Testing the Printer Definition

To verify that you have typed the e-mail addresses correctly in the printer definition and in the sendmail alias file, submit a job from the local system with the **lp** command. For example, if your printer definition is named `deptmail`, enter the following command on the z/OS UNIX command line:

```
lp -d deptmail myfile
```

Results:

1. Use the Infoprint Server ISPF panels to view the IP PrintWay message log. The message log should contain a message similar to the following one:

   ```
   ANFM703I Data set:
   SYSTEM1.NAME.JOB.JOB08385.D0000101.FILENAME
   The data set was successfully emailed to the address:
   user@domainname
   ```

   This message indicates that sendmail successfully accepted the e-mail request. Sendmail verifies that alias names and recipient names for users on the local system are correctly specified. However, an error might occur later when sendmail attempts to send an e-mail to a remote system.

2. If e-mails were sent successfully to the remote systems, you should receive no sendmail error messages. To check for sendmail error messages:

   a. If you specified an owner for a sendmail alias name, see if any mail is returned to the owner's user ID.

   b. See if any mail is returned to the user associated with the IP PrintWay startup procedure. Sendmail returns error messages to this user ID if no other owner is specified for a sendmail alias name or if the e-mail address is specified directly in the printer definition. This user ID is AOPSTC if your installation used the user ID that is suggested in *z/OS Infoprint Server Customization*.

   To check for mail, run the z/OS UNIX **mail** or **mailx** command. For more information about this command, refer to *z/OS UNIX System Services Command Reference*.

   You might need to wait several days before sendmail returns a message to you when it cannot send an e-mail to a remote system. How long you need to wait depends in part on how long it takes the remote system to notify sendmail that an e-mail is undeliverable and in part on how your installation has customized sendmail. Refer to *z/OS Infoprint Server Customization* for more information about customizing sendmail timeout values.

Example
The following ISPF panels show how to create a printer definition named `deptmail`, select the e-mail protocol, and fill in fields that are specific to the e-mail protocol.

Tip: This example shows only some of the ISPF panels and fields that comprise a printer definition. See Appendix D, "Sample IP PrintWay Printer Definitions" on page 389 for a complete printer definition that is suitable for the e-mail protocol.

Use the Add function of the Infoprint Server ISPF panels to create a printer definition. On the Choose a Definition Type and Protocol panel, select the e-mail protocol:

```
              Choose a Definition Type and Protocol
Option ===> 5

Type            Protocol
1 IP PrintWay     LPR
2 IP PrintWay     direct sockets
3 IP PrintWay     IPP
4 IP PrintWay     VTAM
5 IP PrintWay     e-mail
6 PSF for OS/390
7 General
```

To display the following E-mail Protocol panel, press Enter on the **Custom values** field for the Protocol section on the main panel for the printer definition.

```
                          E-mail Protocol

  Printer definition name . deptmail

  E-mail addresses . . myname@xyz.com,dept123,dept456                (extend)
```

Result: E-mails are sent to myname@xyz.com and also to the addresses represented by aliases dept123 and dept456.

To display the following Allocation panel, press Enter on the **Custom values** field for the Allocation section on the main panel for the printer definition.

```
                              Allocation

Printer definition name . deptmail

:
Values for Separator Pages:
   Address  . . _____ (extend)
   Building . . _____
   Department . _____
   Name . . . . _____
   Room . . . . _____
   Title  . . . My default e-mail title_____
:
```

Results:

- For data sets that NetSpool allocates on the JES spool, the e-mail subject is My default e-mail title.
- For data sets that Print Interface allocates on the JES spool, if no other title is specified, the e-mail subject is My default e-mail title.

To display the following IP PrintWay Options panel, press Enter on the **Custom values** field for the IP PrintWay Options section on the main panel for the printer definition.

```
                          IP PrintWay Options

  Printer definition name . deptmail

:
 Dataset grouping . . 3  1. None  2. Job  3. Concatenate job

:
```

Result: IP PrintWay sends all data sets in the same JES2 output subgroup as attachments in the same e-mail.

Specifying Attributes for Allocation

In the Allocation section of the printer definition, you can specify attributes that Print Interface and NetSpool use to allocate output data sets on the JES spool. IP PrintWay uses only some of these attributes when it formats and transmits documents to a printer or e-mail destination.

Note: If an output data set on the JES spool was not processed by Print Interface or by NetSpool, IP PrintWay does *not* use the values specified in the Allocation section; in this case, IP PrintWay uses only the values specified on the DD and OUTPUT JCL statements.

Procedure for Specifying Attributes

On the Allocation panel, specify:

- **Spool allocation values** heading: Specify the JES work-selection criteria defined for the IP PrintWay FSA. Work-selection criteria are defined in the JES2 PRT*nnnnn* and the JES3 DEVICE statement. For example, if the work-selection criterion for the IP PrintWay FSA is class E, specify E in the **CLASS field**.

  IP PrintWay also uses the values in these fields:
  - **FCB**: See "Using an FCB to Format Data" on page 183 for more information.
  - **CLASS**, **DEST**, and **FORMS**: See "Using DEST, CLASS, and FORMS to Select a Printer Definition" on page 167 for more information.

- **Values for Separator Pages** heading:
  - **Address, Building, Department, Name, Room, Title**: Installation-written IP PrintWay exits can read the values specified in these fields. For example, your installation can write an IP PrintWay Begin Data Set exit to print these values on a separator page. See *z/OS Infoprint Server Customization* for information about IP PrintWay exits.
  - **Title**: The value in this field is also used as (1) the subject line of the e-mail when you select the e-mail protocol and (2) the title passed to the LPD when you select the LPR protocol. You can specify up to 60 characters, including blanks and any other printable characters. A title specified by the job submitter overrides this value.

- **Other Values** heading:
  - **Notify**: You can specify up to four user IDs that IP PrintWay notifies when a data set has been successfully or unsuccessfully transmitted, or when IP PrintWay deletes the data set from the JES spool.
  - **Copies**: Specify the number of copies to be printed. Allowed values are 1 to 32640; the default value is 1.

    Guidelines:
    - Specify this field only when you select the IP PrintWay LPR, direct sockets, and IPP transmission protocols; for other protocols, IP PrintWay ignores the number of copies requested and prints only one copy.
    - Some IPP printers do not support the **copies** IPP job attribute; in this case, only one copy prints.
    - If you select the LPR protocol and only one copy prints, deselect the **Optimize copies** field.

- NetSpool does not support values greater than 255. If you specify a value greater than 255, NetSpool allocates an output data set on the JES spool with 255 copies.
- If each copy does not start on a separate page, you might be able to specify printer instructions to force each copy to start on a new page. See "Specifying Printer Commands for Printing Copies" on page 187 for more information.

– **Duplex**: Specify whether to print on one or both sides of the sheet.

The field applies only when IP PrintWay uses the IPP protocol to transmit data to the printer. If the IPP server for the printer does not support the **sides** IPP job attribute, then the printer's default is used.

Using DEST, CLASS, and FORMS to Select a Printer Definition

A z/OS job submitter can specify the printer definition that IP PrintWay is to use on the DD or OUTPUT JCL statement in one of the following JCL parameters:

- FSSDATA parameter: The job submitter can specify the name of the printer definition in the **printer** subparameter of the FSSDATA parameter on the OUTPUT JCL statement. The name of the printer definition is case sensitive and must exactly match the name in the Printer Inventory.
- SUBSYS parameter: When using the Print Interface subsystem, the job submitter must specify the name of the printer definition in the second subparameter of the SUBSYS parameter on the DD statement. The destination, class, and form name are not used to select the printer definition.
- DEST, CLASS, and FORMS parameters: The job submitter can specify values that match the ones specified in the DEST, CLASS, and FORMS fields of the printer definition except when the Print Interface subsystem is used. The job submitter can specify the destination, class, and form name on either the DD or OUTPUT JCL statement. If the job submitter does not specify a value for the DEST, CLASS, or FORMS parameters, the default value assigned by JES must match the corresponding value, if any, specified in the printer definition.

You might want to associate DEST, CLASS, and FORMS values with printer definitions for the following reasons:

- Prior to OS/390 V2R8, IP PrintWay did not support the FSSDATA parameter. Therefore, you might want to enable DEST, CLASS, FORMS printer selection so that a job submitter can continue to use the same JCL parameters as in previous releases.
- If a job submitter specifies the FSSDATA parameter on an OUTPUT JCL statement, the operator cannot redirect the output data set on the JES spool to another printer or e-mail destination before IP PrintWay selects the data set from the JES spool. However, the operator can redirect any job after IP PrintWay selects it for processing; see "Rerouting a Data Set" on page 54 for more information.

To enable printer selection with the DEST, CLASS, and FORMS JCL parameters, you must select the **Use DEST, CLASS, and FORMS for IP PrintWay printer selection** option. You must also specify a unique combination of DEST, CLASS, and FORMS values in each printer definition in which you select this option. You do not need to specify all three DEST, CLASS, and FORMS values in each printer definition.

To select a printer definition, the job submitter specifies the same DEST, CLASS, and FORMS values on the OUTPUT JCL statement that you specified in the printer

definition. For example, if you create the printer definitions shown in the following table:

Printer Definition Name	DEST Field	CLASS Field	FORMS Field
Dept#4	D004	P	Not specified
Dept#5	D005	P	Not specified
Manager#5	D005	P	MANAGER

Then, to select one of these printer definitions, the job submitter can specify the following parameters on the OUTPUT JCL statement:

- To select Dept#4 printer, specify one of the following OUTPUT statements:
  - `//OUT1 OUTPUT DEST=D004,CLASS=P`

    The FORMS parameter can contain any value.
  - `//OUT2 OUTPUT FSSDATA='printer=Dept#4'`
- To select Dept#5 printer, specify one of the following OUTPUT statements:
  - `//OUT3 OUTPUT DEST=D005,CLASS=P`

    The FORMS parameter can contain any value except for MANAGER.
  - `//OUT4 OUTPUT FSSDATA='printer=Dept#5'`
- To select Manager#5 printer, specify one of the following OUTPUT statements:
  - `//OUT5 OUTPUT DEST=D005,CLASS=P,FORMS=MANAGER`
  - `//OUT6 OUTPUT FSSDATA='printer=Manager#5'`

Hierarchy of Printer Selection

If the OUTPUT JCL statement specifies DEST, CLASS, and FORMS values that match more than one printer definition, IP PrintWay selects the printer definition with the best match, using the following hierarchy:

1. The printer definition with matching DEST, CLASS, and FORMS values.
2. The printer definition with matching DEST and CLASS values, but with no matching FORMS value.
3. The printer definition with matching DEST and FORMS values, but with no matching CLASS value.
4. The printer definition with matching CLASS and FORMS values, but with no matching DEST value.
5. The printer definition with matching DEST value, but with no matching CLASS and FORMS values.
6. The printer definition with matching CLASS value, but with no matching DEST and FORMS values.
7. The printer definition with matching FORMS value, but with no matching DEST and CLASS values.

The following example illustrates the hierarchy of printer selection that IP PrintWay uses. If you create the printer definitions shown in the following table:

Printer Definition Name	DEST Field	CLASS Field	FORMS Field
MyDefault	Not specified	P	Not specified
Dept#5	D005	P	Not specified
Manager#5	D005	P	MANAGER

IP PrintWay selects printer definitions as follows:

- If the OUTPUT JCL statement specifies CLASS=P (with any value for DEST except D005 and any value for FORMS except MANAGER), IP PrintWay selects printer definition MyDefault. The MyDefault printer definition is the only printer definition that matches these JCL values.
- If the OUTPUT JCL statement specifies DEST=D005 and CLASS=P (with any value for FORMS except MANAGER), IP PrintWay selects printer definition Dept#5. IP PrintWay uses the selection hierarchy to select printer definition Dept#5 instead of MyDefault, which also matches the JCL values.
- If the OUTPUT JCL statement specifies DEST=D005, CLASS=P, and FORMS=MANAGER, IP PrintWay selects printer definition Manager#5. IP PrintWay uses the selection hierarchy to select printer definition Manager#5 instead of MyDefault or Dept#5, which also match the JCL values.

Procedure for Specifying Attributes

To enable printer selection with the DEST, CLASS, or FORMS JCL parameters, specify the following attributes in the printer definition:

1. On the first ISPF panel for the printer definition, specify the following field:
   - **Use DEST, CLASS, and FORMS for IP PrintWay printer selection**: Select this field.
2. On the Allocation panel, specify the following fields:
   - **CLASS**: Specify a class; leave this field blank if you do not want IP PrintWay to match the value in the CLASS JCL parameter.
   - **DEST**: Specify a destination; leave this field blank if you want do not want IP PrintWay to match the value in the DEST JCL parameter.
   - **FORMS**: Specify a forms name; leave this field blank if you do not want IP PrintWay to match the value in the FORMS JCL parameter.

   The values in the DEST, CLASS, and FORMS fields, together, must be unique in each printer definition in which the **Use DEST, CLASS, and FORMS for IP PrintWay printer selection** option is selected. For example, if you specify DEST PRT5 and CLASS P in one printer definition, you *cannot* specify DEST PRT5 and CLASS P in another printer definition.

Example
The following ISPF panel shows how to request that IP PrintWay use the DEST, CLASS, and FORMS JCL parameters to select this printer definition.

```
  Add                      IP PrintWay Printer Definition

  Printer definition name . MYPRINTER_____
  Description . _____ (extend)
  Location. . . _____ (extend)


                          Component name        Custom values
  Section                 (enter to list)       (enter to customize)
  Allocation         => _____      => *
  Processing         => _____      => __
  NetSpool options   => _____      => __
  NetSpool end-of-file => _____    => __
  IP PrintWay options => _____     => __
  Protocol           => _____      => *
                                                 __

  / Use DEST, CLASS, and FORMS for IP PrintWay printer selection
  NetSpool LU name . _____    LU classes . . __ __ __ __ __ __   (extend)
```

The following ISPF panel shows how to specify the DEST, CLASS, and FORMS values that IP PrintWay uses to select this printer definition. In this example, all three values are filled in; however, you can omit one or two of the values. Only a portion of the ISPF panel is shown.

```
                             Allocation


Spool allocation values:
   CLASS . . . . P              LINECT. . . ___
   DEST. . . . . PRT5____       PRMODE. . . _____
   JES node. . . _____       PRTY. . . . __
   FCB . . . . . ___            SEGMENT . . _____
   FLASH count . ___            THRESHLD. . _____
   FLASH name. . ___            UCS . . . . ___
   FORMS . . . . STD____        WRITER. . . _____
   GROUPID . . . _____
   USERDATA
     . . _____ (extend)
   BURST . . . . _  1. Yes  2. No
   HOLD. . . . . _  1. Yes  2. No
   OUTDISP . . . _  1. Purge  2. Leave  3. Keep  4. Hold  5. Write
 .
 .
 .
```

Handling Unsuccessful Data Transmissions

In the printer definition, you can control how long IP PrintWay waits for errors to be returned from the printer. You can also control whether or not IP PrintWay retries the transmission of data. By default, IP PrintWay does not retry transmissions; therefore, if you want IP PrintWay to retry, you must request retries in the printer definition.

In the printer definition, you can specify:

- **Connection timeout:** This is the maximum amount of time that IP PrintWay waits for TCP/IP to connect to a printer when IP PrintWay uses either the LPR or direct sockets transmission protocol to communicate with the printer. The default value is 30 seconds.

  Typically, TCP/IP returns an error connecting to the printer in a few seconds; however, when the printer is turned off, TCP/IP does not return an error to IP PrintWay. When TCP/IP reports an error connecting to the printer or when the connection timeout value expires, IP PrintWay issues an error message and attempts to connect to the printer again if retries are requested.

  Guidelines:

  – The default value of 30 seconds is suitable for most printers.

  – Do *not* set the timeout value too low because TCP/IP might not be able to connect to the printer in the specified number of seconds due to network traffic.

  – Do *not* set the timeout value too high because the IP PrintWay FSA does not process or print any other data sets while it waits for TCP/IP to connect to the printer.

  – Specify a higher connection timeout value if the timeout value expires before TCP/IP can connect to the printer when the printer is turned on. IP PrintWay reports a TCP/IP error (TCP/IP ERRNO of 60) in an error message when the connection timeout value expires.

- **Response timeout:** This is the maximum amount of time that IP PrintWay waits for a response from a printer. The default value is 10 minutes.

Typically, printers report errors immediately; however, if a printer requires operator intervention (for example, the printer is out of paper), most printers do not report an error at all. When the printer reports an error or when the response timeout value expires, IP PrintWay issues an error message and retries the transmission if requested.

Guidelines:

– Do *not* set the timeout value too low, especially for printers that have a small buffer or print slowly. For example, a response time out value of 30 seconds might cause IP PrintWay to retry the transmission before the printer has finished printing its buffer.

– Do *not* set the timeout value too high because the IP PrintWay FSA does not process or print any other data sets while it waits for the printer to respond.

• **Retry limit** and **Retry time:** The retry limit is the number of times that IP PrintWay retries an unsuccessful transmission when it transmits data to a printer or e-mail destination. The retry time is the amount of time IP PrintWay waits between retries. The time that the transmission attempt takes is not counted as part of the retry time.

While IP PrintWay waits between retries, IP PrintWay continues to select and process other data sets from the JES spool and transmit them to other printers and print queues and to other e-mail destinations. To maintain the correct order of transmission, however, IP PrintWay does *not* transmit other data sets to the *same* printer or e-mail destination.

If you request retries, IP PrintWay retries a transmission one time automatically, immediately after the transmission fails. This automatic retry is in addition to the retries you request in the printer definition. The automatic retry permits the data set to be transmitted successfully when the transmission problem is short-lived. For example, after receiving a data set, some LPDs do not become ready to receive another data set for one or two seconds.

Guidelines:

– When you send data to a printer, you should request that IP PrintWay retry transmissions because some printer errors are short lived.

– When you send data to an e-mail destination, specify *no* retries because errors that z/OS UNIX sendmail reports to IP PrintWay are typically not short lived and because IP PrintWay resends e-mails to the entire list of e-mail addresses, not just to the e-mail address in error.

– Do *not* set the retry time too long because IP PrintWay does *not* attempt to transmit any data sets to the *same* address during this time.

– Because IP PrintWay retries transmissions one time automatically right after an unsuccessful transmission, you might want to specify a retry time and retry limit that allow for resolving problems that take longer to correct.

Example: If you specify the following values:
– Response timeout: 60 seconds (1 minute)
– Retry time: 9 minutes
– Retry limit: 3

The operator would have up to 32 minutes to resolve a problem that requires intervention, such as a printer being out of paper, calculated as follows:

```
1 [response timeout] + 1 [response timeout for automatic retry] +
3 [retry limit] * (9 [retry time] + 1 [response timeout]) = 32
```

The 9-minute retry time starts after the two 1-minute timeout values expire.

Table 10 shows how IP PrintWay retries transmissions when you specify different retry limits and retry times in the printer definition.

Table 10. How Retry Limit and Retry Time Work Together

Retry Limit	Retry Time	IP PrintWay Action
Blank or 0	Any value	IP PrintWay does not retry the transmission.
>0	Blank or 0	IP PrintWay retries the transmission the specified number of times.
>0	>0 but <5 seconds	IP PrintWay retries the transmission the specified number of times at the specified interval.
>0	≥5 seconds	IP PrintWay retries the transmission one time immediately, then the specified number of times at the specified interval.

Procedure for Specifying Attributes

On the IP PrintWay Options panel, specify the following fields:

- **Retry limit**: Specify the number of retries you want IP PrintWay to attempt. Allowed values are 0 – 32767.

- **Retry time**: Specify the time IP PrintWay is to wait between retries. Allowed values are 0 seconds – 9999 hours, 59 minutes and 59 seconds.

- **Connection timeout**: Specify the maximum number of seconds that IP PrintWay is to wait for TCP/IP to connect to the printer. Allowed values are 5 - 180; the default value is 30 seconds. IP PrintWay ignores this field when it sends data to a VTAM-controlled printer, an IPP-enabled printer, or to an e-mail destination.

- **Response timeout**: Specify the maximum number of seconds that IP PrintWay is to wait for a response from the printer before attempting any retries. Allowed values are 0 - 86400; the default value is 600 seconds (10 minutes). IP PrintWay ignores this field when it sends data to an e-mail destination.

Example

The following ISPF panel shows how to specify the amount of time IP PrintWay waits for TCP/IP or the printer to report an error, and how to request that IP PrintWay retry transmissions to the printer. Only a portion of the ISPF panel is shown.

```
                    IP PrintWay Options

 ⋮

 Retry time . . . . . 0000:09:00
 Retry limit. . . . . 3

 Connection timeout . 30
 Response timeout . . 60
 ⋮
```

Results:

- IP PrintWay waits up to 30 seconds for TCP/IP to connect to the printer. If a connection is not established in 30 seconds, IP PrintWay attempts to connect one time immediately. If the connection is still unsuccessful, IP PrintWay attempts to connect again every 9 minutes three times.

  If you select the IPP, VTAM, or e-mail protocol in the printer definition, IP PrintWay does not use the value in the **Connection timeout** field.

- When it sends data to the printer, IP PrintWay waits up to 60 seconds (1 minute) for a response from the printer before it attempts any retries. During this time, the IP PrintWay FSA does not process or print any other data sets.
- If IP PrintWay receives an error when it sends data to the printer, or if IP PrintWay does not receive a response after 60 seconds, IP PrintWay resends the data 1 time immediately. If the transmission is still unsuccessful, IP PrintWay retries the transmission every 9 minutes 3 times.

Retaining Data Sets on the JES Spool

IP PrintWay can retain data sets on the JES spool after successful transmission or after completing all transmission attempts. Although retaining data sets on the JES spool uses spool space, it lets you retransmit data sets that have not printed correctly or have not been successfully sent to the e-mail destination.

If IP PrintWay retains a data set on the JES spool, you can either (1) correct the problem that caused the transmission to fail and retransmit the data set to the same printer or e-mail destination or (2) transmit the data set to a different printer or e-mail destination. See "Resetting a Queue Entry" on page 53 for information about how to retransmit data sets that IP PrintWay retains on the JES spool.

In the printer definition, you can specify:
- A retention period for all data sets that are successfully transmitted. Even though a data set has been transmitted successfully, you might want to retain successfully-transmitted data sets for a short period of time. This is because the data set might still not print successfully due to a printer error or, for the e-mail protocol, z/OS UNIX sendmail might not be able to send the e-mail due to an incorrect e-mail address or an e-mail server problem.
- A retention period for all data sets whose transmission failed, after IP PrintWay has completed all requested retries. If you select the e-mail protocol, IP PrintWay considers the transmission to have failed if z/OS UNIX sendmail does not accept the mail request. Sendmail returns an error if an alias name does not exist or if mail could not be delivered to the local system; however, sendmail does not return an error to IP PrintWay if mail could not be delivered to a remote system.

Procedure for Specifying Attributes

On the IP PrintWay Options panel, specify the following fields:
- **Retention period: Successful**: Specify the amount of time IP PrintWay is to retain successfully transmitted data sets. You can specify a time period from 0 seconds to 9999 hours, 59 minutes and 59 seconds.
- **Retention period: Failure**: Specify the amount of time IP PrintWay is to retain data sets whose transmission failed. You can specify a time period from 0 seconds to 9999 hours, 59 minutes and 59 seconds.

You can also request that IP PrintWay retain data sets on the JES spool forever. To do this, specify **FOREVER** in either field. In this case, you must set up a procedure to delete data sets manually from the JES spool, as described in "Deleting a Transmission-Queue Entry" on page 56.

Example
The following ISPF panel shows how to specify a retention period for data sets whose transmission fails. Only a portion of the ISPF panel is shown.

```
                            IP PrintWay Options

  ⋮

 Retention period:
    Successful. . . . _____     Failure . . 0024:00:00

  ⋮
```

Result: IP PrintWay retains data sets that could not be transmitted on the JES
spool for 24 hours.

Transmitting Multiple Data Sets in a JES2 Output Group

IP PrintWay lets you control how it transmits data sets that are in the same JES2
output subgroup. For more information about JES2 output groups and subgroups,
refer to the following publications:

* *z/OS JES2 Initialization and Tuning Guide*
* *z/OS MVS JCL Reference*

To control how IP PrintWay transmits data sets, select one of the following options
in the **Dataset grouping** field:

* **None**: IP PrintWay transmits each data set in the same JES2 output subgroup as
  soon as it is selected from the JES spool.

  When the target destination is an e-mail address, IP PrintWay sends each data
  set as an attachment in a separate e-mail as soon as it processes the data set.

* **Job**: IP PrintWay transmits each data set as an individual data set, but it
  transmits all data sets in the same JES2 output subgroup at the same time. This
  method increases the probability that data sets in the same JES2 output
  subgroup print together; however, IP PrintWay cannot prevent other applications
  from interleaving print requests to the printer. Each data set arrives and is stored
  as a separate file on the target system. Therefore, the data sets can be
  individually managed on the target spool, and each data set starts printing on the
  front of a sheet.

  When the target destination is an e-mail address, IP PrintWay sends each data
  set as an attachment in a separate e-mail, but it sends the e-mails for all data
  sets that are in the same JES2 output subgroup at the same time.

* **Concatenate job**: IP PrintWay combines all data sets that are in the same JES2
  output subgroup and are to be sent to the same destination into a single
  transmission called a concatenation. This method ensures that data sets in the
  same JES2 output subgroup print together. When transmitting a concatenation,
  IP PrintWay inserts form feeds as needed, to ensure that each data set starts on
  a new page; however, if the data sets are printed on a duplexing printer in duplex
  mode, a data set might start printing on the back side of a sheet.

  When the target destination is an e-mail address, IP PrintWay sends each data
  set in the same JES2 output subgroup as a separate attachment in the same
  e-mail.

  The **Concatenate job** value does not apply when you select the IPP protocol.

If data sets that IP PrintWay concatenated were submitted using different printer
definitions or different print options (because the PRTOPTNS JCL parameter was
specified), some attributes might be different. In this case, IP PrintWay uses the

following attributes only from the printer definition associated with the first data set and ignores these attributes for subsequent data sets in the concatenation:

- Processing panel: **Maximum document size, SOSI mode**
- Protocol panel: **Mode, Restrict ports, Print banner page, Banner class, Banner job name, Filename, Indent, Owner, Print function, Owner, Print function, Title, Width**
- IP PrintWay Options panel: **Connection timeout, Response timeout, Transparent data char, PostScript header, Delete form feed**

In the following cases, the **Dataset grouping** field does *not* apply:

- Print Interface allocates a data set on the JES spool. This is because JES always assigns each data set to a separate output subgroup, even when the user submits multiple data sets with the same **lp** command or in the same job step with the Print Interface subsystem.
- The **Resubmit for filtering** field is selected in the printer definition. This is because Print Interface processes all data sets when this field is selected, even if no filter is specified in the **Filter** field.
- The values for certain parameters on the OUTPUT JCL statements (such as CLASS, DEST, FORMS, and TITLE) are not the same for all data sets. This is because when users do not specify exactly the same values for certain OUTPUT parameters, JES2 assigns the output data sets to separate output subgroups. Refer to *z/OS JES2 Initialization and Tuning Guide* for information about which OUTPUT parameters cause JES2 to group output data sets in separate subgroups.
- NetSpool allocates an output data set on the JES spool. In this case, IP PrintWay transmits each output data set immediately.
- The target address (consisting of IP address and print queue name, IP address and port number, URL, VTAM LU name, or e-mail address list) is not the same for all data sets. Because all data sets within a concatenation must be sent to the same place, IP PrintWay can group data sets together only if they all share exactly the same target address. If a JES2 output subgroup consists of several data sets, some of which have one target address and others of which have a different target address, and if all printer definitions specify that the data sets are to be in a concatenation, IP PrintWay builds two concatenations, each comprised of data sets with the same target addresses.

Procedure for Specifying Attributes

To select how data sets in the same job are transmitted, on the IP PrintWay Options panel, specify the following field:

- **Dataset grouping**: Select **None**, **Job**, or **Concatenate job**. The default is **Job**.

Note: When IP PrintWay processes a data set allocated on the spool by NetSpool, IP PrintWay ignores this field; therefore, select the option that you want for data sets submitted using other job-submission methods.

Example
The following ISPF panel shows how to request that IP PrintWay concatenate all data sets in the same JES output subgroup to ensure that they are printed together or are attachments in the same e-mail. Only a portion of the ISPF panel is shown.

```
                          IP PrintWay Options
 ⋮

   Dataset grouping . . 3  1. None  2. Job  3. Concatenate job


 ⋮
```

Converting Between EBCDIC and ASCII

IP PrintWay can convert data from EBCDIC to ASCII or from ASCII to EBCDIC before transmitting a data set to the remote printer. You specify in the printer definition whether or not you want IP PrintWay to convert data and also the conversion method you want IP PrintWay to use.

Note: IP PrintWay does not convert data between EBCDIC and ASCII if Print Interface has allocated the data set on the JES spool. In this case, Print Interface has already converted data to the printer code page.

IP PrintWay can use one of the following methods to convert data between EBCDIC and ASCII:

- The **iconv** conversion utility (default method)

  The **iconv** utility converts data from one code page to another, from the code page used to create the document to the code page used by the printer. Refer to *z/OS C/C++ Programming Guide* if you want more information about the **iconv** utility. Print Interface also uses **iconv** to convert data from EBCDIC to ASCII. IBM recommends using this method because you can specify attributes in the printer definition that are suitable for both Print Interface and IP PrintWay. By default, IP PrintWay uses this method.

- TCP/IP translation tables

  For compatibility with previous releases, you can request that IP PrintWay use either the standard TCP/IP translation table supplied by IBM or a customized TCP/IP translate table created using the CONVXLAT program. Refer to *z/OS Communications Server: IP Configuration Reference* for information about using translation tables and the CONVXLAT program.

  Notes:
  1. IBM does not recommend using TCP/IP translation tables because if you specify the attributes required for IP PrintWay to use the TCP/IP translation tables, you must create a separate printer definition if you want to use Print Interface to print to the same printer.
  2. When you select the VTAM protocol, do not use the standard TCP/IP translation table because the standard translation table converts data from EBCDIC to ASCII.
  3. When you select the VTAM protocol, IP PrintWay does *not* support DBCS translation tables.

Procedure for Specifying Attributes

The procedure you use depends on how you want IP PrintWay to convert data between EBCDIC and ASCII.

Using iconv to Convert Data Between Code Pages

To use the **iconv** conversion utility to convert data from the document code page to the printer code page, do the following:

- In the IP PrintWay FSS definition, specify the source code page in the **Document code page** field. If no code page is specified, the default is IBM-1047.

- In the IP PrintWay Options section of the printer definition, select **Standard**, **Use FCB**, or **Translate only** in the **Formatting** field. **Standard** is the default.

- On the Processing panel of the printer definition, specify the following fields:

  - **Document code page**: Leave this field *blank*. IP PrintWay uses the document code page you specified in the FSS definition.

  - **Printer code page**: Specify the name of either an ASCII code page (such as ISO8859-1) or an EBCDIC code page (such as IBM-1047) that is supported by IBM. For code page names, refer to *z/OS C/C++ Programming Guide*.

    If you leave this field blank, the default action depends on the protocol selected in the printer definition:

    - VTAM or e-mail protocol: IP PrintWay does not convert data from one code page to another.

    - LPR, direct sockets, or IPP protocol: IP PrintWay uses IBM-850 as the printer code page.

    If you use the ISPF panels to create an IP PrintWay printer definition, the panel, by default, displays either the default ASCII or the default EBCDIC code page that is specified in the Infoprint Server configuration file, depending on the protocol selected in the printer definition:

    - VTAM or e-mail protocol: The EBCDIC code page is displayed.

    - LPR, direct sockets, or IPP protocol: The ASCII code page is displayed.

  - Leave the **Translation data set qualifier** field blank.

  - Leave the **Double-byte translate table** fields blank.

Using the Standard TCP/IP Translation Table

To use the standard TCP/IP translation table to convert from EBCDIC to ASCII, do the following:

- In the IP PrintWay FSS definition, select the **Old-style translation** field. You do not need to select this field if you select a double-byte option in the **Double-byte translate table** field.

- On the IP PrintWay Options panel of the printer definition, in the **Formatting** field: Select **Standard**, **Use FCB**, or **Translate only**. **Standard** is the default.

- On the Processing panel, specify the following fields:

  - **Document code page**: Leave this field blank.

  - **Printer code page**: Leave this field blank.

    Note: When you leave this field blank, Print Interface does not translate data from one code page to another, for example from EBCDIC to ASCII; therefore, your output might not print correctly. If you have a problem printing documents using Print Interface, create a second printer definition for this printer, and specify a printer code page or use the default ASCII code page that is displayed in this field when you use the ISPF panels to create an IP PrintWay printer definition.

  - **Translation data set qualifier**: Leave this field blank.

– **Double-byte translate table**: To print DBCS data, select a double-byte option.

Using a Customized or a DBCS TCP/IP Translation Table

To use a customized TCP/IP translation table or a DBCS TCP/IP translation table to convert data between EBCDIC and ASCII, do the following:

• On the IP PrintWay Options panel in the **Formatting** field: Select either **Standard**, **Use FCB**, or **Translate only** option. **Standard** is the default.

• On the Processing panel, specify the following fields:
  – **Printer code page**: Leave this field blank.

    Note: When you leave this field blank, Print Interface does not translate data from one code page to another, for example from EBCDIC to ASCII; therefore, your output might not print correctly. If you have a problem printing documents using Print Interface, create a second printer definition for this printer, and specify a printer code page or use the default ASCII code page that is displayed in this field when you use the ISPF panels to create an IP PrintWay printer definition.

  – **Translation data set qualifier**: Specify the name of the table.
  – **Double-byte translate table**: To print DBCS data, select a double-byte option.

Search Order for TCP/IP Translation Tables

IP PrintWay uses the following search order to find a customized TCP/IP translation table:

1. *xlate_name.language_name*
2. *tcpip_hlq.xlate_name.language_name*
3. *tcpip_hlq*.STANDARD.*language_name*

where:

xlate_name   Is the name in the **Translation data set qualifier** field.

tcp_hlq   Is the TCP/IP high-level qualifier, TCPIP by default.

language_name
                 For single-byte data streams, *language_name* is TCPXLBIN. For double-byte data stream, *language_name* depends on the value selected in the **Double-byte translate table** field. For example, if you specify the SCHINESE option, *language_name* is TCPSCBIN.

IP PrintWay uses this search order to find a standard TCP/IP translation table:

1. *tcpip_hlq*.LPR.*language_name*
2. *tcpip_hlq*.STANDARD.*language_name*

where:

tcp_hlq   Specifies the TCP/IP high-level qualifier, TCPIP by default.

language_name
                 For single-byte data streams, *language_name* is TCPXLBIN. For double-byte data stream, *language_name* depends on the value selected in the **Double-byte translate table** field. For example, if you specify the SCHINESE option, *language_name* is TCPSCBIN.

Converting Line Data to a Text Data Stream

IP PrintWay automatically converts line data into text data when you select the LPR, direct sockets, IPP, or e-mail transmission protocol in the printer definition *except* in the following situations:

- Print Interface has already formatted the line data into text data.
- A filter is specified in the **Filter** field for the **Line data** format and the **Resubmit for filtering** field is selected. See "Resubmitting Documents to Print Interface for Filtering" on page 191 for more information.
- **Remote PSF** is selected in the **Mode** field. See "Printing with Infoprint Manager for AIX or Windows NT" on page 197 for more information.
- **None** is selected in the **Formatting** field.

You can specify the following fields in the printer definition to control how IP PrintWay converts line data into text data:

- **Line termination**: The line-termination controls required by the target printer. The default is the line feed (LF) control; however, some printers require carriage return and line feed controls (CRLF).
- **Transparent data char**: The transparent-data control used in the input data. IP PrintWay transmits data following the transparent-data control without converting it from EBCDIC to ASCII; however, IP PrintWay does not transmit the transparent data control and the 1–byte length field following the control. The default transparent data control is X'35'.
- **Delete form feed**: An indication of whether or not to delete form-feed controls from the beginning and end of data sets. Consider deleting form-feed controls if your applications insert form-feed controls that result in blank pages printed at the beginning or end of data sets. By default, IP PrintWay does not delete any form-feed controls.
- **Omit line termination at EOF**: An indication of whether or not to omit the LF (line feed) control (or other control specified in the **Line termination** field) at the end of each document. By default, IP PrintWay adds a line-termination control at the end of each line.

  Consider omitting the line-termination control at the end of a document if it causes printing problems. For example, printing problems can occur when applications add transparent data to the end of data. Do not omit the line-termination control if the printer requires a line-termination control at the end of the document in order to print the data.
- **Carriage control type**: An indication of whether or not to use the carriage-control characters to format data. By default, IP PrintWay automatically determines whether or not a data set contains carriage controls and uses carriage controls if they are present. Therefore, in most situations, you do not need to select any value in this field. IP PrintWay performs the same processing for machine and ANSI carriage controls.

IP PrintWay uses the ANSI or machine carriage controls in the input data stream to format data. IP PrintWay supports the print no space, space 1 line, space 2 lines, and space 3 lines carriage controls. If FCB processing is enabled, IP PrintWay also supports skip-to-channel carriage controls. For more information about how to enable FCB processing in the printer definition; see "Using an FCB to Format Data" on page 183.

For data sets with *no* carriage controls, you can specify the following fields in the printer definition to control how IP PrintWay formats data into pages:

- **Pagination**: An indication of whether or not IP PrintWay formats line data without carriage controls into pages. By default, pagination is selected.
- **Margins: Top** and **Margins: Bottom**: Number of blank lines to leave in the top and bottom margins. The default is no margins.
- **Page height**: Number of lines to print on a page. The default is 58 lines.
- **Print page header**: An indication of whether or not to insert a header at the top of each page. The 3–line header contains the fully-qualified data set name and a page number, followed by two blank lines.

Procedure for Specifying Attributes

To format data, specify the following attributes in the printer definition:

- On the Processing panel, specify the following fields:
  - **Pagination**: Select pagination to format data into pages.
  - **Margins: Top** and **Margins: Bottom**
  - **Page height**
  - **Print page header**
- On the IP PrintWay Options panel, specify the following fields:
  - **Formatting**: Select **Standard, Use FCB**, or **Translate only**.
  - **Line termination**: Optionally, specify the line-termination controls (in EBCDIC) required by the target printer. The default is the line feed (LF) control.
  - **Transparent data char**
  - **Delete form feed**
  - **Omit line termination at EOF**

Example

The following ISPF panels show how to specify formatting options for IP PrintWay. The fields shown on the Processing panel apply only for data sets that do not contain carriage-control characters. Only a portion of the panel is shown.

```
                              Processing
:
:
 IP PrintWay Line-to-Text Conversion:
    / Pagination
       Margins:  Top . . 5            Bottom . . 5
       Page height . . . 66
       / Print page header

:
:
```

```
                       IP PrintWay Options
:
:


Formatting:
     Line termination. . . . 0D25
     Transparent data char . 35
     Carriage control type . _  1. None  2. Machine  3. ANSI
     Delete form feed. . . . 3  1. None  2. Leading  3. Trailing  4. Both
     Formatting. . . . . . . 2  1. None          2. Standard
                                3. Translate only  4. Use FCB
     PostScript header . . . _  1. Add            2. Ignore
                                3. Landscape       4. Always landscape
     __ Omit line termination at EOF

:
:
```

Converting Line Data to an SCS or DSC/DSE Data Stream

When you select the VTAM protocol in the printer definition, IP PrintWay automatically converts line data into either SCS or DSC/DSE format *except* when **None** is selected in the **Formatting** field.

IP PrintWay uses the ANSI or machine carriage controls in the input data stream to format data. IP PrintWay supports the print no space, space 1 line, space 2 lines, and space 3 lines carriage controls. If FCB processing is enabled, IP PrintWay also supports skip-to-channel 1-9, A, B and C (1-12) carriage controls. For more information about how to enable FCB processing in the printer definition; see "Using an FCB to Format Data" on page 183.

SCS Page-Formatting Attributes

You can specify SCS page-formatting attributes in the printer definition. You can specify top and bottom margins, left and right margins, the maximum line length, and the maximum page length. The left margin and maximum page length specified in the printer definition are used only if the FCB does not specify other values. These SCS page-formatting attributes are used to generate the SCS Set Horizontal Format (SHF) and Set Vertical Format (SVF) commands.

You cannot set the line density (lines per inch) or the print density (characters per inch) in the printer definition. IP PrintWay sets the line density to the lines per inch specified in the FCB; if FCB processing is not enabled or if no FCB is present, IP PrintWay uses 6 lines per inch. IP PrintWay sets the print density based on the table reference characters (TRCs) in the input data stream, as shown in Table 11. If no TRCs are present, IP PrintWay uses the character density set on the printer's panel.

Table 11. How Table Reference Characters Determine the Characters per Inch

Table Reference Character	Print Density Characters Per Inch (CPI)
0	10 CPI
1	12 CPI
2	15 CPI
3	16.6 or 17.1 CPI (printer dependent)

IP PrintWay does not support SCS controls, such as the X'35' transparent data control, that are embedded in line data. The transparent data control and any other unrecognized characters are converted to blank characters.

Procedure for Specifying Attributes

1. On the Processing panel of the printer definition for an SCS printer, optionally specify the following fields, which are displayed under the **SCS Conversion** heading:

   - **Margins: Top**: The number of the first line of data on a page. The default is no top margin.
   - **Margins: Bottom**: The number of the line at which the bottom margin starts on a page. The default is no bottom margin.
   - **Margins: Left**: The column number at which the left margin starts on a page. If FCB processing is enabled and the FCB specifies a left margin, the FCB value is used instead. The default is column 1.

- **Margins: Right**: The column number at which the right margin starts on a page. The default is no right margin.
- **Line length**: The number of columns to place on one line, including the left and right margins. This value is the SHF Maximum Presentation Position (MPP). The default is the printer default set on the printer panel.
- **Page length**: The number of lines to place on a page, including the top and bottom margins. This value is the SVF Maximum Page Length (MPL). If FCB processing is enabled and the FCB specifies a page size, the FCB value is used instead. The default is the printer default set on the printer panel.

2. On the IP PrintWay Options panel, optionally specify the following fields:
- **Formatting**: Select either the **Standard** or **Use FCB** option. The default is **Standard**. The **Translate-only** option is equivalent to the **Standard** option for the VTAM protocol.
- **Line termination**: Specify the line-termination controls (in EBCDIC) required by the target printer. The default is the carriage-return and new-line (CRNL) controls.
- **Delete form feed**: Specify whether or not you want IP PrintWay to delete form-feed controls from the beginning and end of data sets. Consider deleting form-feed controls if your applications insert form-feed controls that result in blank pages printed at the beginning or end of data sets. By default, IP PrintWay does not delete any form-feed controls.

Other fields under the **Formatting** heading do *not* apply when you select the VTAM protocol.

Example
The following ISPF panels show how to specify formatting values. The values on the Processing panel apply only when IP PrintWay converts line data into SCS format. Only a portion of the ISPF panels are shown.

```
                              Processing
 :
 :

SCS Conversion:
   Margins:  Top . . . 6     Bottom . . 62    Left . . 11    Right . . 71
   Line length . . . . 80              Page length . . 66
   Tabs:  Vertical . . ___  ___  ___  ___  ___   (extend)
          Horizontal . ___  ___  ___  ___  ___   (extend)


 :
 :
```

Results:
- 66 lines are printed on a page; the top and bottom margins contain 5 blank lines; the left and right margins contain 10 blank spaces. However, if the FCB for the data set specifies a left margin and page size value, the FCB values are used instead of the left margin and page length value shown in this example.
- IP PrintWay does not use the **Tabs** fields shown on the Processing panel. Only NetSpool uses these fields when converting SCS data streams to line data streams or PCL data streams.

```
                        IP PrintWay Options
⋮

Formatting:
    Line termination. . . . 0D25

⋮

    Delete form feed. . . . 3  1. None  2. Leading  3. Trailing  4. Both

⋮

    Formatting. . . . . . . 4  1. None          2. Standard
                              3. Translate only  4. Use FCB

⋮
```

Results:IP PrintWay:

- Adds 0D25 to the end of each line.
- Deletes any trailing form feed controls.
- Uses the FCB if one is provided to format the data.

Using an FCB to Format Data

IP PrintWay can optionally use a forms control buffer (FCB) to format line data when IP PrintWay creates a text, SCS, or DSC data stream. IP PrintWay uses an FCB if (1) the **Use FCB** formatting option is selected in the printer definition and (2) an FCB is specified for the data set on the JES spool.

Note: IP PrintWay does *not* format data when Print Interface has allocated the data set on the JES spool unless the VTAM protocol is selected.

An FCB can be specified in several locations. If an FCB is specified in more than one location, IP PrintWay uses the following hierarchy for selecting the FCB:

1. The FCB specified in the FCB parameter of the OUTPUT JCL statement or in the **forms-control-buffer** job attribute. (See JES3 Note 1.)
2. The FCB specified in the **Forms control buffer** field of the printer definition (on the Allocation panel).

   IP PrintWay uses the FCB specified in the printer definition only when either (1) NetSpool allocates the data set on the JES spool or (2) Print Interface allocates the data set on the JES spool and the VTAM protocol is selected.
3. The FCB defined to JES as the default FCB. (See JES3 Note 2.)

JES3 Notes:

1. JES3 passes the FCB parameter specified on an OUTPUT JCL statement to IP PrintWay only if FCB is specified as a JES3 work-selection criterion for the PrintWay FSA.
2. JES3 *always* provides a default FCB to IP PrintWay unless you specify the PDEFAULT=FCB parameter in the JES initialization statement for the IP PrintWay FSA.
3. Refer to *z/OS Infoprint Server Customization* for information about how to configure JES3 initialization statements for IP PrintWay.

The specified FCB must reside in the SYS1.IMAGELIB library. IP PrintWay prefixes the specified FCB name when it searches for the FCB in SYS1.IMAGELIB, as follows, depending on the transmission protocol selected in the printer definition:

- For the VTAM protocol, IP PrintWay prefixes the FCB name with FCB2 to create the member name. If the FCB cannot be located with the FCB2 prefix, then the FCB request is ignored, and default values are used. The default values are skip-to-channel 1 line 1.
- For other protocols, IP PrintWay prefixes the FCB name with FCB4 to create the member name. If this member is not found in SYS1.IMAGELIB, PrintWay uses prefix FCB2, and if it is not found, PrintWay uses prefix FCB3. If no members are found, PrintWay issues a message stating that the member does not exist in SYS1.IMAGELIB, and releases the data set to JES to be put in hold status.

If the **Use FCB** option is selected and an FCB is specified, IP PrintWay honors skip-to-channel carriage controls in the input data, in addition to carriage controls for print no space, space 1 line, space 2 lines, and space 3 lines. If an FCB is specified but the input data does not contain carriage controls, IP PrintWay either ignores the FCB or reports an error, depending on the transmission protocol selected in the printer definition:

- For the VTAM protocol, IP PrintWay does not use the FCB.
- For other protocols, IP PrintWay reports an error.

Table 12 summarizes the FCB functions that IP PrintWay supports. IP PrintWay supports different FCB functions depending on the type of output data stream that IP PrintWay creates. For example, the DSC/DSE data stream does not support specification of the number of lines per inch.

Table 12. FCB Functions Supported by IP PrintWay

FCB Function	Output Data Stream		
	Text[1]	SCS[2]	DSC/DSE[2]
Number of lines per page	Yes	Yes	Yes
Number of lines per inch	No	Yes	No
Channel codes	Yes	Yes	Yes
Left margin (indexing)	No	Yes	No
Skip a line	Yes	Yes	Yes

1. IP PrintWay can create a text data stream when you select the LPR, direct sockets, IPP, or e-mail protocol.
2. IP PrintWay can create an output SCS or DSC/DSE data stream when you select the VTAM protocol.

Procedure for Specifying Attributes

To format data sets using an FCB, specify the following fields in the printer definition:
- On the IP PrintWay Options panel, specify the following field:
  - **Formatting**: Select **Use FCB**.
- On the Allocation panel, specify the following field:
  - **FCB**: Name the FCB to be used to format print requests. IP PrintWay uses this FCB only when it processes data sets that (1) NetSpool allocates on the JES spool or (2) Print Interface allocates on the JES spool when the VTAM protocol is selected.

When you select **Use FCB** in the **Formatting** field, IP PrintWay uses the FCB only if an FCB is specified for the data set; if no FCB is specified, IP PrintWay performs

its standard formatting. Therefore, you can select **Use FCB** even if some data sets do not require or name an FCB. In a JES3 environment, however, you might want to configure the IP PrintWay FSA so that JES3 does not pass a default FCB name to IP PrintWay.

Example
The following ISPF panel shows how to request the IP PrintWay use the FCB, if one is specified, to format the data. Only a portion of the ISPF panel is shown.

```
                            IP PrintWay Options
  ⋮
  Formatting:
  ⋮
     Formatting. . . . . . . 4  1. None          2. Standard
                                3. Translate only 4. Use FCB
  ⋮
```

Printing Data Without Formatting

If your batch applications create output that contains ASCII text data, PCL data, PDF data, or AFP data, you must request in the printer definition that IP PrintWay transmit the data sets to the printer or e-mail destination without formatting the data. To do this, select the IP PrintWay **none** formatting option in the printer definition.

In some situations, even though IP PrintWay does not format the data, it might be necessary for IP PrintWay to translate the data stream to either ASCII or EBCDIC, depending on the requirements of the target destination. In this situation, select the **translate only** formatting option in the printer definition.

Select the IP PrintWay **none** formatting option when your batch applications create:
- ASCII text, PCL, or PDF data to be printed on an ASCII printer
- AFP, PCL, or PDF data to be sent to an e-mail destination
- PCL data to be printed on a VTAM-controlled PCL printer

Select the IP PrintWay **translate only** formatting option when your batch applications print:
- ASCII text data to be mailed to an e-mail destination

In the following situations, IP PrintWay can automatically determine that it should transmit the data stream unchanged to the printer; therefore, in these cases, it ignores the IP PrintWay formatting option selected in the printer definition and automatically processes data sets as if the **none** formatting option were selected:
- The data stream contains a PostScript header.
- Print Interface converted the data stream to a format suitable for its destination.
- The target print server is Infoprint Manager. (The **Remote PSF** option is selected on the LPR Protocol panel.)
- NetSpool converted the data stream to a PCL data stream. (The **Convert to PCL** option is selected on the NetSpool Options panel.)
- The data is to be sent to a VTAM-controlled printer as transparent data. (The **Send as transparent** field is selected on the VTAM Protocol panel).

Procedure for Specifying Attributes

On the IP PrintWay Options panel, specify the following fields:

- **Formatting**: Select **None** or **Translate only**.

  When you select the **None** or **Translate only** formatting option, IP PrintWay ignores the following fields:

  - Processing panel: All fields under the **IP PrintWay Line-to-Text Conversion** and **SCS Conversion** headings
  - IP PrintWay Options panel: All fields under the **Formatting** heading (except for the **Formatting** field)

- Optionally, specify other fields such as **Document header** and **Document trailer**.

Example

The following ISPF panel shows how to request that IP PrintWay not translate or format data. Only a portion of the ISPF panel is shown.

```
                           IP PrintWay Options
:
:
 Formatting:
:
:
    Formatting. . . . . . . 1  1. None           2. Standard
                              3. Translate only  4. Use FCB
:
:
```

Sending Instructions to the Printer

In the printer definition, you can specify printer instructions that IP PrintWay sends to the printer. You can specify printer instructions in the following fields:

- **Document header**: IP PrintWay sends these printer instructions to the printer at the beginning of each document. For example, you could send printer instructions (also called a printer setup string) at the beginning of each document to select a font or the number of lines printed per inch.

- **Document trailer**: IP PrintWay sends these printer instructions to the printer at the end of each document. For example, you could send printer instructions at the end of each document to reset the printer to its default state.

You can specify printer instructions in either EBCDIC or ASCII representation, and you can request that IP PrintWay convert the printer instructions to the printer's code page (either an EBCDIC or ASCII code page) before transmitting them to the printer. For example, if the printer accepts ASCII data, you can enter the printer instructions in EBCDIC in the printer definition and request that IP PrintWay convert them to ASCII before transmission. For information about how IP PrintWay converts data between EBCDIC and ASCII, see "Converting Between EBCDIC and ASCII" on page 176.

When you enter data in EBCDIC in the printer definition, you can use the following special values, which IP PrintWay converts to the indicated EBCDIC hexadecimal values; if you use these special values, use EBCDIC representation for the rest of the printer instructions as well:

Value	Hex (EBCDIC)	Meaning
<FF>	0C	Form feed
<CR>	0D	Carriage return

Value	Hex (EBCDIC)	Meaning
<LF>	25	Line feed
<ESC>	27	Escape
<SP>	40	Space

The printer instructions you specify in the printer definition apply only to the document itself and not to any data added by the IP PrintWay Begin Data Set exit and the IP PrintWay End Data Set exit. See the description of IP PrintWay exits in *z/OS Infoprint Server Customization* for more information.

Specifying SCS Controls for VTAM-Controlled Printers

When you print to VTAM-controlled SCS printers, you can specify SCS controls in the **Document header** and **Document trailer** fields. For example, if your printer supports the Page Presentation Media (PPM) control, you can specify the PPM control in the **Document header** field to adjust the paper drawer, duplex option, and other media-related characteristics. In the **Document trailer** field, you can reset the printer to its original state. Consult the documentation for your printer to determine which SCS controls your printer supports.

IP PrintWay automatically generates SCS controls in the SCS data stream that it sends to the printer. Therefore, if you specify these same controls in the **Document header** field, the printer ignores them. The SCS controls that IP PrintWay generates in the SCS data stream are:
- SLD (Set Line Density)
- SPD (Set Print Density)
- SHF (Set Horizontal Format)
- SVF (Set Vertical Format)

Although you cannot specify the SHF and SVF controls in the **Document header** field, you can specify the SHF maximum presentation position (MPP) and the SVF maximum page length (MPL) in the printer definition. See "SCS Page-Formatting Attributes" on page 181 for more information.

Specifying Printer Commands for Printing Copies

When you print multiple copies of the same document, the printer commands you specify in the **Document header** and **Document trailer** fields are sent to the printer before and after each copy.

Most printers automatically print each copy on a new sheet of paper. However, some printers print the next copy on the back side of the sheet, or even on the same side as the previous copy. To determine if your printer prints each copy on a new sheet of paper, print multiple copies of a data set that is less than one page in length.

If the second copy does *not* start on a new sheet of paper, then specify one of the following printer commands, depending on the type of data typically printed on the printer. For most printers, you should specify the command in the **Document trailer** field; however, for other printers, you might need to specify the printer command in the **Document header** field or in both fields:
- For PostScript data streams, specify the PJL Universal Exit Language (UEL) command:

  <ESC>%-12345X
- For non-PostScript data streams, specify the PCL Select Front command:

`<ESC>&a1G`

Notes:

1. Some printers that accept PCL commands might not accept the PJL UEL command.
2. Do not specify these commands for VTAM-controlled printers.

Procedure for Specifying Attributes

On the IP PrintWay Options panel, specify the following fields:

- **Document header**: Specify printer instructions to be sent to the printer at the beginning of each document and each copy of a document.
- **Translate document header**: Select this field if the value needs to be converted to the code page the printer accepts. For example, select this field if the **Document header** field is in EBCDIC representation and the printer accepts ASCII data.
- **Document trailer**: Specify printer instructions to be sent to the printer at the end of each document and each copy of a document.
- **Translate document trailer**: Select this field if the value needs to be converted to the code page the printer accepts. For example, select this field if the **Document trailer** field is in EBCDIC representation and the printer accepts ASCII data.

Tip: If you need to specify the same printer instructions in more than one printer definition, specify them in an IP PrintWay Options component. Then, include that component in each printer definition to which the values apply.

Example

The following ISPF panel shows how to specify PCL commands in a document header and trailer for a PCL printer. Only a portion of the ISPF panel is shown.

```
                          IP PrintWay Options
  :

  Document header  . . <ESC>E<ESC>&l2A<ESC>&l1O<ESC>&l8D<ESC>&l1E<ESC (extend)
     / Translate document header
 Document trailer . . <ESC>E                                         (extend)
     / Translate document trailer

  :
```

Note: Place your cursor on `Extend` and press Enter in order to enter the entire document header value.

```
               Extended Field
  Command ==>

 Document header
 <ESC>E<ESC>&l2A<ESC>&l1O<ESC>&l8D<ESC>&l1E<ESC>&l66F<ESC>(s12H
 _____
 _____
 _____
 _____
```

Result: IP PrintWay sends the instructions in the **Document header** field to the printer. The PCL commands in the **Document header** field have the following meaning:

Command   Meaning

<ESC>E   Reset the printer

<ESC>&l2A   Set paper size to letter, (note the ″l″ is a lower case L)

<ESC>&l1O   Set orientation to landscape, (note the ″O″ is a capital letter O)

<ESC>&l8D   Set lines per inch to 8

<ESC>&l1E   Set top margin to 1 line

<ESC>&l66F   Set number of print lines to 66

<ESC>(s12H   Set font pitch to 12 characters per inch

The <ESC>E in the **Document trailer** field resets the printer.

The **Translate document header** and **Translate document trailer** fields are selected so that IP PrintWay translates the data from EBCDIC to ASCII before transmission to the printer.

Formatting for PostScript Landscape Orientation

IP PrintWay can format non-PostScript data sets in the landscape orientation for printing on a PostScript printer.

Note: IP PrintWay does *not* format documents that Print Interface has allocated on the JES spool because Print Interface formats them. Print Interface does not support formatting documents in the landscape orientation.

IP PrintWay can add the following PostScript attributes to the beginning of all data sets. To understand these attributes, refer to a PostScript publication.

```
614 25 translate 90 rotate .88 .76 scale
/n 1 def
/fs 10 def
/ls 11.2 def
/ld ls 2 mul def
/lt ls 3 mul def
/t 740 fs sub def
/y t def /ff t def /os 20 def
/s 512 string def
/Courier-Bold findfont
fs scalefont setfont
/p {n {copypage} repeat erasepage} def
/i (%stdin) (r) file def
/{/c i read not {p stop} if def
c 26 eq {p stop} if
/x 20 def
/y c 43 eq {y /x os def}
{c 32 eq {y ls sub}
{c 48 eq {y ld sub}
{c 45 eq {y lt sub}
{c 49 eq {ff} {y} ifelse}
ifelse} ifelse} ifelse} ifelse def
/ff 0 def
y 65 le {p /y t def} if x y moveto
/os i s readline not {p stop} if dup show
length 0 eq {20} {20.72} ifelse def } loop
```

Limitations: The following limitations apply:

- If you select the PostScript landscape printing option, do not use this printer definition to print PostScript data sets from a batch application; if you do, an error occurs.

- Do not select the PostScript landscape printing option when you select the e-mail protocol.

Procedure for Specifying Attributes

On the IP PrintWay Options panel, specify the following fields:

- **Formatting**: Select the **Standard** option.
- **PostScript header**: Select the **Landscape** option.

Validating That Documents Can Print as Requested

Before transmitting a data set to the printer, IP PrintWay uses information you provide in the printer definition to validate that the data set can print as requested on the target printer. IP PrintWay can validate that the data set does not exceed limits that you specify for document size and does not exceed the number of copies you specify. You might want to specify limits because the printer itself has certain limitations, such as a small buffer that cannot receive large data sets, or you might want to specify limits for other reasons, such as you want to prevent job submitters from printing large documents on slow printers.

Table 13 lists the fields in the printer definition that you can specify to limit the data sets that can print on the printer. The third column in the table indicates the JCL parameter that the job submitter specifies to request the print function, and the fourth column indicates the action IP PrintWay takes when the limit is exceeded.

Table 13. Printer Definition Fields Used for Validation

ISPF Field Name	Meaning of Field	JCL Parameter	IP PrintWay Action
Maximum document size	Maximum size (in bytes) of document allowed. This number includes the size of all copies.[12]	None. IP PrintWay determines the document size.	IP PrintWay does not transmit the data set.[3]
Maximum copies	Maximum number of copies allowed.[14]	COPIES	IP PrintWay transmits the number of copies allowed.

Notes:

1. The number of copies specified in the form definition is not included when the number of copies or the size of a data set is calculated.
2. If you select the VTAM protocol in the printer definition, IP PrintWay does not limit the size of data sets that can print.
3. If IP PrintWay does not transmit the data set, it retains the data set on the JES spool if a retention period for failed transmissions is specified in the printer definition. The operator can then reroute the data set to a different printer.
4. If you select the VTAM or e-mail protocol, IP PrintWay does not limit the number of copies requested. This is because only one copy prints when you select the VTAM protocol and only one copy is sent when you select the e-mail protocol.

You can specify additional fields that Print Interface uses to validate that print requests can print as requested. For example, Print Interface can validate that the printer accepts the document format of the data set. If Print Interface determines that a document cannot print, Print Interface does not allocate an output data set on the JES spool. See "Validating That Documents Can Print as Requested" on page 96 for more information about validation performed by Print Interface.
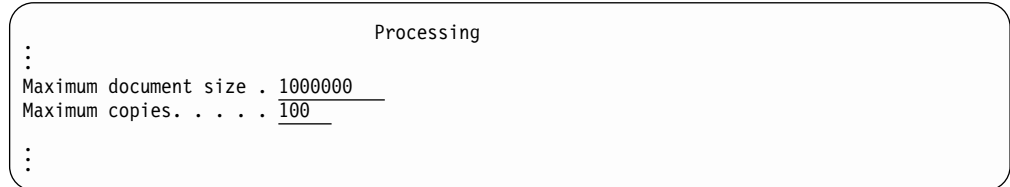
Procedure for Specifying Attributes

On the Processing panel, optionally specify the following fields:

- **Maximum document size**: Specify the maximum number of bytes in one data set, including copies, that can be printed. Allowed values are 1 - 2147483646. The default value is no limit.
- **Maximum copies**: Specify the maximum number of copies of the same data set that can be printed. Allowed values are 1 - 32640. The default value is no limit.

Example

The following ISPF panel shows how to limit the document size and number of copies. Only a portion of the ISPF panel is shown.

```
                              Processing
  .
  .
  .
Maximum document size . 1000000
Maximum copies. . . . . 100
  .
  .
  .
```

Resubmitting Documents to Print Interface for Filtering

The IP PrintWay **Resubmit for filtering** option lets you use Print Interface filters to transform data in any output data set that IP PrintWay selects from the JES spool. This option lets you use the following AFP data transforms provided by the Infoprint Server Transforms product:

- The AFP to PCL transform, which lets you print AFP and line-data documents to PCL printers
- The AFP to PostScript transform, which lets you print AFP and line-data documents to PostScript printers
- The AFP to PDF transform, which lets you create PDF output for viewing and printing from a workstation.

If you select the **Resubmit for filtering** field in the printer definition, you can use transforms provided by Infoprint Server Transforms to transform any data set that IP PrintWay selects from the JES spool, including output data sets created by TSO applications, batch applications, and NetSpool. If you do *not* select the **Resubmit for filtering** field in the printer definition, job submitters that want to transform output must submit print requests directly to Print Interface, for example, using the **lp** command, the AOPPRINT JCL procedure, or the Print Interface subsystem.

Figure 14 on page 192 shows the processing that occurs when you select the **Resubmit for filtering** field in a printer definition.
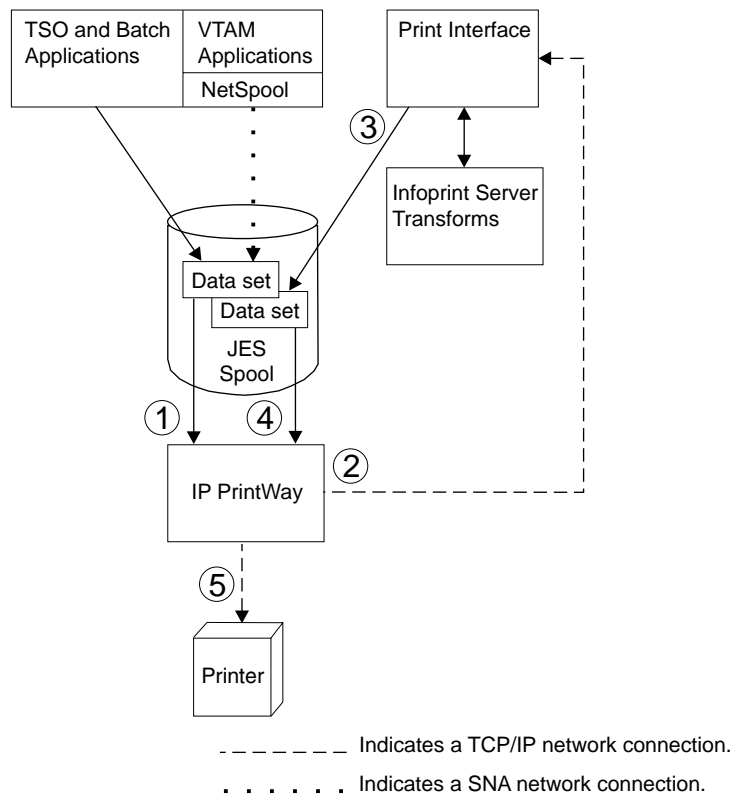
Figure 14. Processing When Resubmit for Filtering Option is Selected

1. IP PrintWay selects a data set from the JES spool. It selects the printer definition to use based on the parameters specified on the OUTPUT JCL statement. (The job submitter can specify either the FSSDATA parameter or the DEST, CLASS, and FORMS parameters to select the printer definition.) IP PrintWay detects that the data set has not already been processed by Print Interface.

2. Because the **Resubmit for filtering** field is selected in the printer definition, IP PrintWay transmits the data set and its JCL parameters to Print Interface.

3. Print Interface validates that the printer supports the data format and the print options requested in the JCL parameters. Print Interface calls the transform filter (if any) associated with the input data format and writes the transformed data to a second output data set on the JES spool.

4. IP PrintWay selects the second output data set from the JES spool. If Print Interface has called a data transform, IP PrintWay transmits the data, unchanged, to the target printer; otherwise, IP PrintWay performs the formatting specified in the printer definition.

5. IP PrintWay transmits the data to the remote printer.

Steps 2, 3, and 4 are performed only when the **Resubmit for filtering** field is selected.

Note: The processing shown in Figure 14 results in two data sets allocated on the JES spool. Therefore, do *not* select this option unless necessary because system performance can be adversely affected.

The following considerations apply when IP PrintWay resubmits a data set to Print Interface for filtering:

- IP PrintWay writes *two* accounting records for the same data, one for the first data set transmitted to Print Interface (see step 2) and another for the second data set transmitted to the printer (see step 5). Your system programmer can write an IP PrintWay SMF exit routine to suppress one of the SMF records. See Chapter 18, "Using Accounting Information in SMF Type 6 Records" on page 357 for more information about the SMF accounting record.
- IP PrintWay retains *both* data sets on the JES spool if you specify a retention period in the **Retention period** fields. Retention periods specified at job submission, for example on an OUTPUT JCL statement, apply only to the first data set allocated on the JES spool.
- The Print Interface LPD must listen at port 515.
- Job submitters *cannot* specify the printer's IP address, print queue name, or port number on the OUTPUT JCL statement or in an Infoprint Server job attribute. IP PrintWay ignores these values if specified at job submission and, instead, uses the values in the printer definition.
- Do *not* select the **Resubmit for filtering** field in the IP PrintWay default printer definition.
- JES always assigns each data set that Print Interface allocates on the JES spool to a separate JES output subgroup. This is true even if the data set was originally in the same JES output subgroup as other data sets when IP PrintWay first selected it from the JES spool. Therefore, when you select the **Resubmit for filtering** field, IP PrintWay *cannot* transmit data sets in the original JES output subgroup together to the target printer or send them in the same e-mail. The following results occur:
    - Data sets in the same original JES output subgroup might not print together or might not print in the original order, even if the **Job** or **Concatenate job** option is selected in the **Dataset grouping** field. This result is especially likely if your installation has customized the Infoprint Server Transform Manager so that it can transform more than one data set at the same time. When you transform more than one data set at the same time, small data sets are transformed more quickly and then IP PrintWay can transmit them to the target printer before larger data sets.
    - Data sets in the same original JES output subgroup are always sent in separate e-mails, even if the **Concatenate job** option is selected in the **Dataset grouping** field.
    - If your installation adds a separator page only before the first data set in a JES output subgroup, that separator page prints before each data set.
- The second sysout data set, which Print Interface allocates on the JES spool, contains the same job name, job ID, and last qualifier of the data set name as the original sysout data set on the JES spool. Therefore, the operator can use these values to find the job submitter's data set on the JES spool.

Refer to *z/OS Infoprint Server Customization* for information about how to write IP PrintWay exit routines and configure the Print Interface LPD.

Procedure for Specifying Attributes

On the Processing panel, specify the following fields:

- **Resubmit for filtering**: Select this field to enable the IP PrintWay transform function.
- **Data Format** and **Filter**: Select the data format and specify the associated filter program to transform the data. Also, optionally specify other fields used by the filters. See Chapter 14, "Planning Printer Definitions for Infoprint Server Transforms" on page 201 for information about the fields to specify.

- Validation fields: Optionally specify fields that Print Interface uses to validate the print request, such as the **Duplex supported** field. See "Validating That Documents Can Print as Requested" on page 96 for information about these fields. By default, Print Interface does not perform validation.

On the Allocation panel, specify the JES allocation parameters that Print Interface uses when it allocates data sets on the JES spool after filtering. See "Specifying JES Allocation Parameters" on page 93 for information about these fields. For example, be sure to specify values for the JES work-selection parameters, such as CLASS, that IP PrintWay uses to select data sets from the JES spool. (Refer to *z/OS Infoprint Server Customization* for more information about JES work-selection parameters.) In some cases, the values the job submitter specified on the OUTPUT JCL statement override the corresponding values you specify in the Allocation panel. Table 14 shows the OUTPUT JCL statement parameters that override the values on the Allocation panel.

Table 14. OUTPUT JCL Statements that Override Allocation Values When Resubmit for Filtering Option is Selected

OUTPUT Parameters	Printer Definition Fields
ADDRESS, BUILDING, DEPT, NAME, ROOM, TITLE	Address, Building, Department, Name, Room, Title
DATACK	Print error reporting
DUPLEX	Duplex
CHARS [1]	Character sets
COPIES[2]	Copies
FORMDEF	Form definition
FORMS[3]	FORMS
INTRAY, OUTBIN	Input tray, Output bin
OFFSETXB, OFFSETXF OFFSETYB, OFFSETYF	Image shift x-direction back/front Image shift y-direction back/front
OVERLAYB, OVERLAYF	Overlay back/front
PAGEDEF[4]	Page definition
PRMODE	PRMODE
TRC	Table reference characters
USERLIB	Resource library

1. If the CHARS parameter is not specified, the value in the UCS JCL parameter is used.
2. The COPIES parameter can also be specified on the DD JCL statement.
3. The form name can also be specified in the SYSOUT parameter on the DD statement.
4. If PAGEDEF parameter is not specified, the value in the FCB JCL parameter is used.

Example
The following ISPF panel shows how to request that all line data and AFP data be transformed to PCL data using the **afp2pcl.dll** filter. Only a portion of the ISPF panel is shown.

```
                          Processing

  .
  .
  .
  Supported data formats and associated filters:
  Data format:  Filter:
  / Line data    afp2pcl.dll _____  (extend)
  / MO:DCA-P     afp2pcl.dll _____  (extend)
  _ PostScript   _____  (extend)
  / Text         aopfiltr.so _____  (extend)
  / PCL          _____  (extend)
  _ PDF          _____  (extend)
  _ SAP          _____  (extend)
  _ Other        _____  (extend)

  / Resubmit for filtering

  .
  .
  .
  Maximum document size . _____
  Maximum copies. . . . . ____
  Forms supported . . . . _____ _____ _____ _____ _____
  Duplex supported. . . . / Simplex   / Duplex   / Tumble
  Print-error reporting supported . / Character   / Position
  .
  .
  .
```

The following ISPF panel shows how to specify the JES allocation values that Print
Interface uses when it allocates the data set on the JES spool.

```
                              Allocation
Spool allocation values:
   CLASS . . . . E               LINECT. . . ___
   DEST. . . . . BLDG5           PRMODE. . . _____
   JES node. . . _____        PRTY. . . . ___
   FCB . . . . . ___             SEGMENT . . _____
   FLASH count . ___             THRESHLD. . _____
   FLASH name. . ____            UCS . . . . ___
   FORMS . . . . STD_____        WRITER. . . _____
   GROUPID . . . _____
   USERDATA
     . . _____ (extend)
   BURST . . . . _  1. Yes  2. No
   HOLD. . . . . _  1. Yes  2. No
   OUTDISP . . . _  1. Purge  2. Leave  3. Keep  4. Hold  5. Write
Values for Separator Pages:
   Address
     . . _____(extend)
   Building . . _____
   Department . _____
   Name . . . . _____
   Room . . . . _____
   Title  . . . _____
Resource Related Values:
   Form definition . _____
   Character sets  . ___    ___   ___   ___
   Overlay front . . _____     Back . . _____
   Input tray  . . . ___
   Output bin  . . . _____
   Page definition . _____
   Resource library. _____ (extend)
   Image shift x-direction front . . _____     Back . . _____
              y-direction front . . _____     Back . . _____
Error Reporting Values:
   Print error reporting. . _  1. None  2. All  3. Character  4. Position
   Error disposition. . . . _  1. Default  2. Hold  3. Quit
   _ Print error messages
        Maximum messages. .___
Other Values:
   Notify . . . . . . . _____   at node . . _____
                        _____   at node . . _____
                        _____   at node . . _____
                        _____   at node . . _____
   Checkpoint pages . . _____
   Checkpoint seconds . _____
   Copies . . . . . . . ____
   Copy group . . . . . __  __   __   __   __   __   __ __
   Color map. . . . . . _____
   Com setup member . . _____
   JES form length. . . _____
   Resolution . . . . . ___
   Duplex. . . . . . . _  1. Simplex  2. Duplex  3. Tumble
   Label data pages . . _  1. Yes  2. No
   Restrict printable area . . _  1. Yes  2. No
   _ Table reference characters
```

Result: Print Interface allocates data sets on the JES spool with CLASS=E and DEST=BLDG5. Print Interface uses the FORMS value specified by the job submitter on the OUTPUT JCL statement instead of std, which is specified in the **FORMS** field. See Table 14 on page 194 for information about other JCL values that override values specified on this panel.

Printing with Infoprint Manager for AIX or Windows NT

IP PrintWay can use the LPR protocol to transmit data sets to Infoprint Manager for AIX or Infoprint Manager for Windows NT. When processing a file for Infoprint Manager, IP PrintWay does not convert data to ASCII and does not format the input data; however, IP PrintWay adds a record length field to each record as required by Infoprint Manager.

IP PrintWay also transmits AFP options, such as the name of a form definition, in the LPD control file for use by Infoprint Manager. IP PrintWay prefixes these options with **-o**. Appendix C, "Infoprint Manager Options" on page 385 lists the **-o** options that IP PrintWay transmits in the control file. You can specify additional **-o** options in the **User options** field on the Protocol panel.

Procedure for Specifying Attributes

On the Protocol panel, specify the following fields:
- **Mode**: Select the **Remote PSF** option.
- **IP address**: Specify the IP address or host name where Infoprint Manager is running.
- **Print queue name**: Specify the name of the remote print queue.
- **User options**: Optionally, specify options for Infoprint Manager.

On the Allocation panel, specify the following fields, which IP PrintWay transmits to Infoprint Manager if Print Interface or NetSpool allocate the data set on the JES spool:
- **Spool allocation values:**
  - **CLASS**
  - **DEST**
  - **FORMS**
  - **FCB**
  - **PRMODE**
  - **UCS**
- **Resource Related Values:**
  - **Form definition**
  - **Character sets**
  - **Input tray**
  - **Output bin**
  - **Page definition**
  - **Image shift**
- **Error Reporting Values: Print error reporting**
- **Other Values:**
  - **Copies**
  - **Duplex**
  - **Table reference characters**

Notes:
1. IP PrintWay uses the values specified on the Allocation panel only when it transmits an output data set that was allocated on the JES spool by Print Interface or NetSpool.

2. When you select the **Remote PSF** option, IP PrintWay ignores the **Formatting** field in the IP PrintWay section. IP PrintWay processes data sets as if you had selected the **None** formatting option.

Creating an IP PrintWay Default Printer Definition

If a job submitter specifies the printer IP address on an OUTPUT JCL statement (in the DEST=IP parameter), but does not specify a printer definition name in the FSSDATA parameter, IP PrintWay obtains printing options from the IP PrintWay default printer definition. You can create one IP PrintWay default printer definition. In this printer definition, you can specify default values that IP PrintWay uses if any of the following OUTPUT JCL parameters are not specified on the OUTPUT JCL statement:
- RETAINF and RETAINS
- RETRYL and RETRYT
- PRTOPTNS

IP PrintWay uses the values in its default printer definition only when the OUTPUT JCL statement contains the DEST=IP parameter and the FSSDATA=printer parameter is omitted. If the FSSDATA parameter is also specified, IP PrintWay instead uses values in the printer definition that is specified in the FSSDATA=printer parameter.

If you do not create a default printer definition, IP PrintWay uses the following default values for the JCL parameters:

JCL Parameter	IP PrintWay Default
RETAINS	0; IP PrintWay does not retain data sets on the JES spool after transmission is successful.
RETAINF	0; IP PrintWay does not retain data sets on the JES spool after transmission fails.
RETRYL	0; IP PrintWay does not retry unsuccessful transmissions.
RETRYT	0; IP PrintWay does not wait between retries.
PRTOPTNS	IP PrintWay uses default values for all printer attributes that apply to IP PrintWay. Refer to the ISPF field help for information about default values.

Procedure for Specifying Attributes

To create an IP PrintWay default printer definition, create an IP PrintWay printer definition and specify the attributes that apply to IP PrintWay. The following attributes have special considerations:
1. On the main ISPF panel for the printer definition, specify the following fields:
   - **Printer definition name**: Specify DFLTNTRY, using uppercase characters.
   - **Use DEST, CLASS, and FORMS for IP PrintWay printer selection**: Do *not* select this field.
2. On the Processing panel:
   - Do *not* select the **Resubmit for filtering** field. If you select this field, IP PrintWay ignores the IP address that the job submitter specifies in the DEST=IP parameter of the OUTPUT JCL statement and transmits the data set to the IP address specified in the printer definition.
3. On the Protocol panel, specify the following fields:

- **Protocol**: Select either **LPR** or **Direct sockets** protocol. However, IP PrintWay can change the protocol based on the parameters specified during job submission on the OUTPUT JCL statement. IP PrintWay uses the LPR protocol if the PRTQUEUE parameter is specified, and uses the **direct sockets** protocol if the PORTNO parameter is specified.
- **Printer IP address**, **Print queue name**, **Port number**, and **URL**: Leave these fields blank because IP PrintWay always uses the IP address and print-queue name or port number specified on the OUTPUT JCL statement.

Creating Components for Use With the PRTOPTNS JCL Parameter

In the PRTOPTNS parameter of the OUTPUT JCL statement, a job submitter can specify the name of a set of components that contain IP PrintWay printing options. IP PrintWay uses the printing options in these components instead of the options that are specified in the printer definition that IP PrintWay uses to print the data set.

You need to create components for use with the PRTOPTNS JCL parameter only if job submitters want to print with different printing options from those specified in the printer definition. One situation where users might want to specify different printing options is when you have not created a printer definition for the printer and IP PrintWay uses options in the default printer definition. (IP PrintWay uses options in the default printer definition when the job submitter specifies the DEST=IP JCL parameter and omits the FSSDATA=printer JCL parameter.)

You can specify IP PrintWay options in three different types of components:
- Processing
- IP PrintWay Options
- Protocol

When the job submitter names a set of components in the PRTOPTNS JCL parameter, IP PrintWay uses only a subset of all the options that might be specified in the named components. IP PrintWay ignores the other options in the components. "Procedure for Specifying Attributes" identifies the fields that contain the options that IP PrintWay uses from the components.

Procedure for Specifying Attributes

Rules:
- Use the same name for the Processing, IP PrintWay Options, and Protocol components.
- Because the PRTOPTNS parameter lets a job submitter specify a maximum of 16 characters, limit the component name to 16 characters.
- Create at least one Processing, IP PrintWay Options, or Protocol component. If a component does not exist, IP PrintWay uses default values for the printing options in the missing component.

Follow these steps to create a set of components for the PRTOPTNS parameter:
1. In the Processing component, specify any of the following fields; leave a field blank if you want IP PrintWay to use the default value:
   - **Pagination**
   - **Margins: Top** and **Margins: Bottom**
   - **Page height**
   - **Print page header**
   - **Maximum document size**
   - **SOSI mode**

- **Translation data set qualifier**
- **Double-byte translation table**

2. In the IP PrintWay Options component, specify any of the following fields; leave a field blank if you want IP PrintWay to use the default value:
   - **Exits: Begin data set**
   - **Exits: End data set**
   - **Exits: Record**
   - **Dataset grouping**
   - **Line termination**
   - **Transparent data char**
   - **Carriage control type**
   - **Delete form feed**
   - **Formatting**
   - **PostScript header**
   - **Omit line termination at EOF**

3. In the Protocol component, specify any of the following fields; leave a field blank if you want IP PrintWay to use the default value:
   - **User Options**
   - **Mode**
   - **Restrict ports**
   - **Print banner page**
   - **Banner class**
   - **Filename**
   - **Indent**
   - **Owner**
   - **Print function**
   - **Title**
   - **Width**

Note: If you specify a value for any field that is not in this list, IP PrintWay ignores the value and, instead, uses the value in the printer definition.

Example

Assume that you have created a Processing component, an IP PrintWay Options component, and a Protocol component named **PWoptions**. To use IP PrintWay options in these components, the job submitter can specify the PRTOPTNS parameter in an OUTPUT JCL statement, as shown:

```
//OUT1 OUTPUT PRTOPTNS='PWoptions' ...
```

The component name is case sensitive; therefore, if the name contains special characters or lower case characters, the job submitter must enclose the name in quotation marks.

Chapter 14. Planning Printer Definitions for Infoprint Server Transforms

Infoprint Server Transforms provides transforms that convert documents from one data format to another. The two categories of transforms are:

- Transforms that let you print non-AFP documents to IBM AFP printers. These transforms convert PCL, PostScript, PDF, and SAP to either line data or AFP format. (IBM AFP printers accept both line data and AFP data.)
- Transforms that let you print AFP documents to non-AFP printers. These transforms convert line data and AFP data to PCL, PostScript, or PDF format.

Note: In this publication, the terms AFP and MO:DCA-P are used interchangeably to refer to the IBM Mixed Object Document Content Architecture Presentation data format. AFP also refers to documents that contain line data mixed with AFP data.

Each transform provides a *filter* program that converts the data. A filter is a program that modifies the input data before it is sent to the printer. In a printer definition, you can associate a filter with an input data format (line data, MO:DCA-P, PCL, PDF, PostScript, SAP, text, and other). When you associate a filter with a data format, Print Interface automatically calls the associated filter when the document to be printed contains that input data format.

Print Interface is the only component of Infoprint Server that can use a filter to transform data. NetSpool does not support filters. However, IP PrintWay can submit data sets to Print Interface so that a filter can be used. This IP PrintWay function lets you transform data in output data sets from TSO applications, batch applications, and NetSpool. For more information about this IP PrintWay function, see "Resubmitting Documents to Print Interface for Filtering" on page 191.

This chapter describes how to specify printer attributes to accomplish the following tasks:

Task	See Page:
Transforming PCL, PDF, PostScript, and SAP Data to AFP Data	201
Transforming AFP Data and Line Data to PCL, PDF, and PostScript Format	205

Transforming PCL, PDF, PostScript, and SAP Data to AFP Data

Infoprint Server Transforms provides transforms that convert PCL, PostScript, PDF, and SAP data to either line data or AFP data. These transforms let you print non-AFP documents on IBM AFP printers. Table 15 lists the transforms, their functions, and the name of the transform filter that you specify in the printer definition.

Table 15. Transforms and Filter Names

Transform	Function	Filter Name
PCL to AFP	Transforms PCL 5e data to AFP data	pcl2afp.dll
PostScript to AFP	Transforms PostScript Level 3 data to AFP data	ps2afp.dll
PDF to AFP	Transforms PDF 1.2 data to AFP data	ps2afp.dll

Table 15. Transforms and Filter Names (continued)

Transform	Function	Filter Name
SAP to AFP	Transforms SAP OTF Versions 1 and 2 data to AFP data; transforms SAP ABAP Versions 1 and 2 data to line data	sap2afp.dll

Note: The same **ps2afp.dll** filter transforms both PostScript and PDF documents to AFP format.

Filter Options

Each filter accepts options that let you control processing of the transform. Table 16 lists the filter names and options that you can specify in a printer definition.

Table 16. Filter Names and Filter Options

Filter	Options
pcl2afp.dll	[%filter-options] [-a *imagetype*] [-c *transformclass*] [-p *pagerange*] [-t *outputtype*]
ps2afp.dll (for PDF)	[%filter-options] [-a *imagetype*] [-c *transformclass*] [-l *length*] [-p *pagerange*] [-r *resolution*] [-t *outputtype*] [-w *width*] [-x *xmargin*] [-y *margin*]
ps2afp.dll (for PostScript)	[%filter-options] [-a *imagetype*] [-c *transformclass*] [-g *pagerange*] [-i *initializationfile*] [-l *length*] [-p *pagerange*] [-r *resolution*] [-t *outputtype*] [-w *width*] [-x *xmargin*] [-y *ymargin*]
sap2afp.dll	[%filter-options] [-p *pagerange*] [-r *resolution*] [-s]

The filter options have these meanings:

%filter-options
> Causes options specified in the **filter-options** job attribute (specified, for example, on the **lp** command) to be passed to the transform.
>
> You can type the **%filter-options** option in any position relative to the other filter options. If you specify filter options to the right of **%filter-options**, those options override the same options specified in the **filter-options** job attribute, except for the **-g** *pagerange* and **-p** *pagerange* options. If you specify these options, the pages specified in all occurrences are selected for printing.

-a, -c, -g, -i, -l, -p, -r, -s, -t, -w, x, -y
> These options have the same meaning as the same options on the z/OS UNIX shell command that performs the transform. Refer to *z/OS Infoprint Server User's Guide* for an explanation of these options. Table 17 lists the filters and the corresponding shell commands.

Table 17. Filters and Corresponding Shell Commands

Filter Name	Command Name
pcl2afp.dll	pcl2afp
ps2afp.dll (for PDF data)	pdf2afp
ps2afp.dll (for PostScript data)	ps2afp
sap2afp.dll	sap2afp

You can specify the same options on the transform commands and in the **Filter** field of a printer definition *except* for the **-o** *outputfile* option. You can specify the **-o** option only on the transform commands.

Tip: Use the **-l** and **-w** filter options to specify the maximum length and width of the generated image. The default values for these options are suitable for letter size paper. Therefore, if the printer typically prints on another size paper, specify values that are suitable for that paper size. For example, in this example, the **-l** and **-w** options specify values suitable for A4 paper

```
                            Processing
  :
  :
Supported data formats and associated filters:
Data format:  Filter:
  :
  :
/ PCL          ps2afp.dll -l 297mm -w 210mm %filter-options -r 300     (extend)
/ PDF          sap2afp.dll -l 297mm -w 210mm %filter-options -r 300    (extend)
  :
  :
```

Procedure for Specifying Attributes

On the Processing panel, specify:

- **Data format** field: Select the format of the input document to which the filter applies.
- **Filter** field: Specify the name of the filter followed by any filter options. Type the absolute pathname if the filter is not in a directory named in the LIBPATH environment variable.
- **Resubmit for filtering** field: This field applies only to IP PrintWay printer definitions and is ignored if specified in a PSF for OS/390 printer definition. Selecting this field can adversely affect system performance; see "Resubmitting Documents to Print Interface for Filtering" on page 191 for more information before you select this field.

Tips:

1. If you plan to configure the same filters in several printer definitions, consider creating a Processing component. Then include the Processing component in each printer definition. For example, you could create one Processing component for all PSF for OS/390 printer definitions; in that component, configure the transforms that convert PCL, PostScript, PDF, and SAP data to AFP format.

2. If you specify a filter in a component, you *must* erase (space over) any filters that are specified in the Processing section of the printer definition itself. If any filters are specified in the printer definition itself, the filters specified in the component are not used.

3. On the Allocation panel, you can specify the name of the form definition, page definition, and fonts that PSF for OS/390 is to use when it prints AFP data created by the PCL to AFP, PDF to AFP, or PostScript to AFP transform.

   The SAP to AFP transform determines the appropriate form definition, page definition, and fonts to use from its configuration files and overrides any form definition, page definition, and fonts you specify on the Allocation panel. For information about the SAP to AFP transform configuration files, refer to *z/OS Infoprint Server Customization*.

Example

The following ISPF panel shows how to specify the transform filters that convert PCL, PostScript, and PDF data to AFP format in a PSF for OS/390 printer definition. Only a portion of the ISPF panel is shown.

```
                              Processing
:
:
Supported data formats and associated filters:
Data format:  Filter:

/ Line data    _____    (extend)
7 MO:DCA-P     _____    (extend)
7 PostScript   ps2afp.dll  %filter-options -r 300          (extend)
7 Text         _____    (extend)
7 PCL          pcl2afp.dll -c letter_300 %filter-options   (extend)
7 PDF          ps2afp.dll  %filter-options -r 300          (extend)
7 SAP          sap2afp.dll %filter-options -r 300          (extend)
_ Other        _____    (extend)

_ Resubmit for filtering
:
:
```

The selected data formats and filters are suitable for an IBM AFP printer controlled by PSF for OS/390:

- The **Line data** and **MO:DCA-P** data formats are selected because PSF can accept those data formats. No filter is required.

- The **Text** data format is selected because Infoprint Server automatically converts text data into line data when the printer definition is a PSF for OS/390 printer definition. No filter is required.

- The **PostScript** and **PDF** data formats are selected because the associated **ps2afp.dll** filter transforms PostScript data and PDF data to AFP format.

- The **PCL** data format is selected because the associated **pcl2afp.dll** filter transforms PCL data to AFP format.

- The **SAP** data format is selected because the associated **sap2afp.dll** filter transforms SAP data to either line data or AFP format.

The filter options have these meanings:

- The **%filter-options** option that is specified for all three filters causes the transforms to use any filter options that a job submitter might specify in the **filter-options** job attribute, for example on an **lp** command.

- The **-c** option causes the transform to use options and environment variables specified in the **letter_300** transform class in the Infoprint Server transform configuration file. Refer to *z/OS Infoprint Server Customization* for more information about transform classes.

  Because the **-c** option for the **pcl2afp.dll** filter is specified to the *left* of the **%filter-options** option, the **-c** option specified in the **filter-options** job attribute overrides the **-c** option specified here.

- The **-r** option causes the transform to format the output for a 300-pel resolution printer.

  Because the **-r** option for the **ps2afp.dll** and **sap2afp.dll** filters is specified to the *right* of **%filter-options**, the transforms ignore the **-r** option specified in the **filter-options** job attribute.

Transforming AFP Data and Line Data to PCL, PDF, and PostScript Format

Infoprint Server Transforms provides transforms that convert AFP data and line data to PCL, PDF, or PostScrippt format. These transforms let you print AFP documents and line-data documents that require formatting with a page definition on PCL and PostScript printers. Table 18 lists the transforms, their functions, and the name of the transform filter that you specify in the printer definition.

Table 18. Transforms and Filter Names

Transform	Function	Filter Name
AFP to PCL	Transforms line data and AFP data to PCL 5, 5e, or 5C (color) data	afp2pcl.dll
AFP to PDF	Transforms line data and AFP data to PDF 1.2 data	afp2pdf.dll
AFP to PostScript	Transforms line data and AFP data to PostScript level 2 (monochrome or color) data	afp2ps.dll

You do *not* need to use one of these transforms in order to print line-data documents on a printer that can accept text data. This is because IP PrintWay can convert line-data documents to text format for printing on any printer that can print text data. You must use one of these transforms, however, if you want to use a page definition to format line-data documents. See "Converting Line Data to a Text Data Stream" on page 179 and "Using an FCB to Format Data" on page 183 for information about how IP PrintWay converts line-data documents into text format.

Filter Options

Each transform filter accepts options that let you control processing of the transform. Table 19 lists the filters and options that you can specify in the printer definition.

Table 19. Filters and Filter Options

Filter Name	Options
afp2pcl.dll	[%filter-options] [-c *transformclass*] [-i *inputcodepage*] [-F *tracefile*] [-T *traceoptions*]
afp2pdf.dll	[%filter-options] [-c *transformclass*] [-i *inputcodepage*] [-F *tracefile*] [-T *traceoptions*]
afp2ps.dll	[%filter-options] [-c *transformclass*] [-i *inputcodepage*] [-F *tracefile*] [-T *traceoptions*]

The filter options have these meanings:

%filter-options
> Causes options that are specified in the **filter-options** job attribute (specified, for example, on the **lp** command) to be passed to the transform.
>
> You can type the **%filter-options** option in any position relative to the other filter options. If you specify filter options to the right of **%filter-options**, those options override the same options specified in the **filter-options** job attribute.

-c *transformclass*
> Specifies the name of a transform class that is defined in the transform configuration file, **aopxfd.conf**. (Refer to *z/OS Infoprint Server*

Customization for information about the configuration file.) The transform class determines the following options:

- The characteristics of the output printer device, such as whether it supports color
- Page-formatting options, such as paper sizes
- Default page and form definitions
- Default resource libraries
- Default font

The job submitter can also specify this option in the **filter-options** job attribute.

-i *inputcodepage*

This option applies only to the **Line data** data format. If you specify this option for any other data formats, for example the **MO:DCA-P** data format, it is ignored.

This option identifies the code page to which line data is converted before it is transformed. Specify a code page that corresponds to the coded fonts that the transform uses to transform the line data. These coded fonts can be specified in the page definition, in the **chars** job attribute or CHARS JCL parameter, and in the **Character sets** field of the printer definition.

To transform line data that is already encoded in the code page that corresponds to the coded fonts, do *not* specify this option. When this option is not specified, line data is not converted from one code page to another before it is transformed. For example, to transform line-data documents that specify coded fonts (for example, in the CHARS JCL parameter) and currently print correctly on an AFP printer, do *not* specify this option.

You *must* specify this option to correctly transform documents that are encoded in code pages that do not correspond to the code page for the coded fonts. This is most likely to occur when the Print Interface LPD receives print requests with a print command of **r** in the LPD control file. Print command **r** indicates that the file contains ANSI carriage control characters (FORTRAN carriage control) and is, therefore, line data.

To determine the code page to specify, first determine the PSF code page ID for each character set; refer to *IBM AFP Fonts: Font Summary for AFP Font Collection* for PSF code page IDs. Then determine the name of the corresponding code page provided by IBM and supported by the **iconv** utility; refer to *z/OS C/C++ Programming Guide* for valid code page names.

Note that the names of the PSF code page IDs and the code pages provided by IBM are different. For example, if the coded fonts in the following table are specified (for example, in the CHARS JCL parameter), specify the IBM-500 code page in the **-i** option: `-i IBM-500`.

Coded Font	PSF Code Page ID	IBM Code Page
40D0, 40F0, 40E0, 4100	T1V10500	IBM-500
60D9 (default font)	T1V10500	IBM-500

When you specify this option, also ensure that the code page specified in the **Document code page** field of the printer definition identifies the code page in which input documents are encoded; the default document code page is the code page for the locale. A job submitter can also specify a document code page for a specific print job in the **document-codepage** job

attribute. See "Converting Data from EBCDIC to ASCII or ASCII to EBCDIC" on page 110 for a description of the **Document code page** field.

> **Note:** When you specify this option, you might need to create a separate printer definition for use only by those applications that require the **-i** option and code page conversion.

-F *tracefile* **-T** *traceoptions*
> These options trace the transforms. Your IBM service representative might ask you to specify these options to help IBM diagnose problems. These options can also be specified in the **filter-options** job attribute. Refer to *z/OS Infoprint Server Messages and Diagnosis* for an explanation of these options.

AFP Attributes Used by Transforms

You can also specify AFP attributes that these transforms use in the printer definition. Usually, you would specify AFP attributes only for IBM AFP printers controlled by PSF. However, these transforms use many of the same AFP attributes to convert line-data and AFP documents to PCL, PostScript, or PDF format. For example, you can specify the default AFP form definition for the transforms in the **Form definition** field of the printer definition. Table 20 lists the fields in a printer definition that these transforms use.

Table 20. Fields Used by AFP to PCL, AFP to PDF, and AFP to PostScript Transforms

Field Name	Meaning	Notes
Carriage control type	Type of carriage controls in the document (none, ANSI, machine)	If blank, Infoprint Server detects the type of carriage controls; therefore, in most cases, leave this field blank.
Character sets	One to four coded font names	• The transforms use this font for line data when no font is specified in the page definition. X0 is prefixed to the font. • If blank, the transforms use the font in the transform configuration file or the system default font X060D9. • See Notes 3 and 4.
Duplex	Duplexing option (simplex, normal, tumble) used to format output and control printing on PCL and PostScript printers	• Also select the duplex option in the **Duplex supported** field. • If blank, the transforms use the value in the form definition. See Note 2.
Form definition	Form definition used to format line-data and AFP documents	If blank, or the name **dummy** is specified, the transforms use the first inline form definition. If none exists, they use the form definition in the transform configuration file or F1CP0110. See Note 3.
Image shift x-direction back	Offset in the x direction for the back side of a page	If blank, the transforms use the value in the form definition. See Note 2.
Image shift x-direction front	Offset in the x direction for the front side of a page	If blank, the transforms use the value in the form definition. See Note 2.
Image shift y-direction back	Offset in the y direction for the back side of a page	If blank, the transforms use the value in the form definition. See Note 2.
Image shift y-direction front	Offset in the y direction for the front side of a page	If blank, the transforms use the value in the form definition. See Note 2.

Table 20. Fields Used by AFP to PCL, AFP to PDF, and AFP to PostScript Transforms (continued)

Field Name	Meaning	Notes
Input tray	Input tray number on the AFP printer	• The transforms map this number to the printer tray number using mapping values specified in the AOP_TRAYID environment variable in the transform configuration file. See Note 3. • If blank, the transforms use the value in the form definition. See Note 2.
Output bin	Output bin number on the AFP printer	• This attribute does not apply to the AFP to PDF transform. • If blank, the transforms use the value in the form definition. See Note 2.
Overlay back	Overlay for the back side of each page, used in addition to overlays named in the form definition	
Overlay front	Overlay for the front side of each page, used in addition to overlays named in the form definition	
Page definition	Default page definition for line-data documents	If blank, or the name **dummy** is specified, the transforms use the first inline page definition. If none exists, they use the page definition in the transform configuration file or P1P08682. See Notes 3 and 4.
Resource library	Libraries that contain AFP resources, such as fonts, page segments, form definitions, and page definitions. The transforms search these libraries before searching resource libraries named in the transform configuration file.	• The user ID that starts Infoprint Server daemons must have read access to these libraries. • If blank, the transforms search only libraries named in the transform configuration file. See Note 3.
Table reference characters	Indication of whether the document contains table reference characters (TRCs)	

Field Name	Meaning	Notes

Notes:

1. All of the fields in this table have corresponding Infoprint Server job attributes and OUTPUT statement (JCL) parameters. Values specified in a job attribute or OUTPUT parameter override the values specified in the printer definition. For example, the value in **form-definition** job attribute or the FORMDEF JCL parameter overrides the value in the **Form definition** field.

2. Some values, such as duplex, can also be specified in the form definition used to print the document. The value in the printer definition overrides the value in the form definition, even if the form definition was specified by the job submitter. Therefore, if you want the transform to use the value specified in a user-specified form definition, leave the field in the printer definition blank and, instead, specify a default form definition that contains the desired value.

   For example, if you want to specify duplex as the default, but do not want the duplex default to override the value in a user-specified form definition, do the following:

   • Leave the **Duplex** field blank.

   • Specify a form definition that contains the duplex option, such as F1CP0111, in the **Form definition** field.

3. For information about the transform configuration file, **aopxfd.conf**, refer to *z/OS Infoprint Server Customization*.

4. The font and page definition specified in the printer definition or transform configuration file are not used if JES supplies a default font and page definition to IP PrintWay. JES might supply a default font and page definition for data sets submitted to IP PrintWay as batch jobs with OUTPUT JCL statements. When you define the IP PrintWay functional subsystem to JES, you can request that JES not supply a default font and page definition to IP PrintWay. Refer to *z/OS Infoprint Server Customization* for more information.

   When the job submitter uses the Print Interface subsystem, the transforms do not use the JES default font and page definition.

Procedure for Specifying Attributes

On the Processing panel, specify:

• **Data format** field: Select the input data formats that you want transformed. You can select **MO:DCA-P**, **Line data**, and **Other**.

   Notes:

   1. Select **Line data** if you want to transform line-data documents.

   2. If you select **Line data** but the transform does not transform some of your line-data documents, also select **Other**. You need to select **Other** if your line data contains characters, such as null bytes, that prevent Print Interface from identifying your data as line data. In these cases, Print Interface identifies the data as **Other**.

• **Filter** field: Specify the name of the filter in the **Filter** fields next to each of the data formats you selected in the **Data format** field. Follow the filter name with any of the filter options listed in Table 19 on page 205. Type the absolute pathname if the filter is not in a directory named in the LIBPATH environment variable.

• **Resubmit for filtering** field: Select this field if you want to transform line-data or AFP documents that are not usually processed by Print Interface. You must select this field to transform line-data or AFP output data sets from TSO applications, batch applications, and NetSpool. See "Resubmitting Documents to Print Interface for Filtering" on page 191 for more information about this field.

• Validation fields: If you select **Resubmit for filtering**, optionally specify fields that Print Interface uses to validate the JCL parameters. See "Validating That Documents Can Print as Requested" on page 96 for information about these fields.

On the Allocation panel, specify:

- AFP fields: Optionally specify default AFP resources and other AFP values listed in Table 20 on page 207.

Tips:

1. If you plan to configure the same filters in several printer definitions, consider creating a Processing component and an Allocation component. For example, create one Processing component and one Allocation component for all printers that print PCL data. In the Processing component, configure the AFP to PCL transform; in the Allocation component, specify the default AFP resources suitable for a PCL printer. Then include the Processing and Allocation components in each printer definition to which they apply.

2. When you include a Processing component that specifies filters in a printer definition, remove (space over) any filters that are specified in the Processing section of the printer definition itself. If any filters are specified in the printer definition, the filters specified in the component are not used.

   When you add a new printer definition that uses the IP PrintWay LPR, direct sockets, or IPP protocols, notice that filter **aopfiltr.so** is initially displayed in the **Filter** field for the **Text** document format. Be sure to remove this filter if you want to use filters from the component instead.

Example

The following ISPF panel shows how to specify the AFP to PCL transform in an IP PrintWay printer definition. Only a portion of the ISPF panel is shown.

```
                         Processing
:
:

Supported data formats and associated filters:
Data format:  Filter:

/ Line data  afp2pcl.dll -c US                                  (extend)
/ MO:DCA-P   afp2pcl.dll -c US                                  (extend)
_ PostScript _____  (extend)
/ Text       aopfiltr.so                                        (extend)
/ PCL        _____  (extend)
_ PDF        _____  (extend)
_ SAP        _____  (extend)
_ Other      _____  (extend)


/ Resubmit for filtering
:
:
Maximum document size . _____
Maximum copies. . . . . ___
Forms supported . . . . _____ _____ _____ _____     (more)
Duplex supported. . . . / Simplex  /  Duplex   / Tumble
Print-error reporting supported . / Character / Position
:
:
```

The selected data formats and filters are suitable for a printer than can accept PCL and text data:

- The **Line data** and **MO:DCA-P** data formats are selected because the **afp2pcl.dll** filter can transform line-data and AFP documents to PCL format. The **-c** option causes the transform to use environment variables specified in the **US** transform class in the Infoprint Server transform configuration file. Refer to *z/OS Infoprint Server Customization* for more information about transform classes.

- The **Text** and **PCL** data formats are selected because the printer can accept these data formats. The **aopfiltr.so** filter is specified for **Text** data. See "Using the aopfiltr.so Filter" on page 98 for information.

The **Resubmit for filtering** field is selected so that the filters are used for line-data and AFP documents not usually processed by Print Interface, such as output data sets from TSO, batch jobs, and NetSpool.

The following ISPF panel shows how to specify AFP resources used by the transform in the Allocation section of an IP PrintWay printer definition. Only a portion of the panel is shown.

```
                            Allocation


  :
  :
Resource Related Values:
   Form definition . F1CP0111
   Character sets  . 60D8      ____  ____  ____
   Overlay front . . O1LOGOA    Back . . O1LOGOB
   Input tray  . . . ___
   Output bin  . . . _____
   Page definition . P1P06362
   Resource library. _____  (extend)
   Image shift x-direction front . . _____      Back . . _____
            y-direction front . . _____      Back . . _____
  :
  :
Other Values:

  :
  :
   Duplex . . . . . . . _  1. Simplex  2. Duplex  3. Tumble
  :
  :
    _ Table reference characters
```

The transform uses the following AFP resources unless other values are specified by the job submitter:

- Form definition F1CP0111
- Page definition P1P06362
- Font X060D8
- Overlay O1LOGOA on the front side, and overlay O1LOGOB on the back side of a two-sided document

Chapter 15. Defining NetSpool Printer LUs to VTAM

To define a NetSpool printer LU to VTAM, do the following tasks:

- Select NetSpool printer LU names.
- Create VTAM APPL statements for each NetSpool LU name.
- Define resources in VTAM applications.

In addition to defining the NetSpool LU names to VTAM, you must specify the NetSpool LU names in the printer definitions for the target printers. In the printer definitions, you also specify other printer attributes used by NetSpool. See Chapter 12, "Planning Printer and Printer Pool Definitions for NetSpool" on page 121 for information.

Selecting NetSpool Printer LU Names

Each installation determines how many NetSpool printer logical units (LUs) to define. A sample configuration might be to define one NetSpool printer LU to replace each SNA-network printer in your installation. Alternatively, you could define a greater or fewer number of NetSpool logical printers than you have SNA-network printers.

Each NetSpool printer LU is identified with a 1 to 8 character alphanumeric name. You specify this LU name in the printer definitions and in the application-program LU name you use to define the NetSpool printer LU to VTAM.

When you name logical printers, you can do one of the following without changing the primary LU (PLU) resource definitions of your VTAM applications:

- Assign NetSpool logical-printer names that are the *same* as the printer names currently defined in the resource definitions of the VTAM applications. For example, if the printer LU name used by a VTAM application is IMSPR001, the NetSpool LU name could be IMSPR001.
- Assign NetSpool logical-printer names that are different from the printer names used by the VTAM application. You might want to do this to make the NetSpool LU names more meaningful to your operators. For example, if the printer LU name used by your VTAM application is IMSPR001, the NetSpool LU name could be LUPRT001.

  You map the old and new names to each other in the VTAM APPL statements that define the logical printers to VTAM, as described in the ACBNAME parameter in "Creating APPL Statements" on page 214.

In either of these two cases, because only one set of VTAM definitions with the same names can be known to VTAM at a time, you must do one of the following:

- Remove the VTAM LU statements for the SNA-network printers.
- Deactivate the major node containing the VTAM LU statements before activating the logical-printer LUs with the same name.

This means, of course, that other VTAM applications cannot communicate with the SNA-network printers at the same time NetSpool is running.

Note: If other VTAM applications still need to communicate with the SNA-network printers at the same time NetSpool is running, you must assign new PLU names in the resource definitions of the VTAM applications using NetSpool.

Use the new printer names as the NetSpool logical-printer names and also as the application-program LU names when you define the logical printers to VTAM.

Naming Considerations for IMS/CICS Users of Telnet

In IMS or CICS subsystems, applications receive communication services from terminal-management functions of subsystems. Thus, the IMS programmer thinks of a device as an LTERM, and the CICS programmer thinks of a device as a TCTTE entry.

Many IMS and CICS applications have algorithms that derive LTERM or TCTTE names for printers by performing some hashing technique on the input LTERM or TCTTE names. If NetSpool is used with Telnet, this creates problems because Telnet assigns the input LU name (and thereby the LTERM or TCTTE name) arbitrarily from a pool of LU names. If this type of algorithm is in use in your installation, and you are using Telnet, IBM recommends that you use the IP-LU mapping feature of Telnet. This feature enables you to specify the input LU name rather than having it randomly selected from a pool. This would, in turn, permit the application to select the LU name for the printer. See the LUMAP statement described in *z/OS Communications Server: IP Configuration Reference*.

Creating APPL Statements

NetSpool runs as a VTAM application program, maintaining separate LU-LU sessions for each NetSpool printer LU. Each LU-LU session is between:

* A primary LU, which is the VTAM application that initiates the VTAM session and sends print requests
* A secondary LU, which is the NetSpool printer LU

You must create a VTAM APPL definition statement in the SYS1.VTAMLST data set for each NetSpool printer LU. Create the APPL statement in a new or existing application major node definition. Figure 15 shows two sample APPL statements under a major node named NETSPOOL.

```
NETSPOOL  VBUILD TYPE=APPL
*
LUPRT001  APPL  MODETAB=ISTINCLM,DLOGMOD=S3270,EAS=1,SESSLIM=YES
IMSPR002  APPL  ACBNAME=LUPRT002,MODETAB=ISTINCLM,DLOGMOD=SCS,EAS=1,SESSLIM=YES
```

Figure 15. Sample APPL Statements for NetSpool LUs

The parameters on the APPL statement are:

statement-name

> Specifies the secondary LU name used by VTAM applications to establish a VTAM session. If this name does not match the NetSpool LU name specified in the printer definition, the ACBNAME parameter must match the LU name in the printer definition. Specify one to eight alphanumeric characters. In this example, the names are: LUPRT001 and IMSPR002.

ACBNAME=*lu-name*

> Specifies the NetSpool LU name. This name must match the LU name specified in the printer definition.
>
> This parameter is optional. If you omit it, VTAM defaults the ACBNAME to the name specified as the *statement-name*.

If the LU name in the printer definition matches the *statement-name*, IBM recommends that you omit the ACBNAME parameter and let it default, as shown in the first APPL statement in Figure 15 on page 214.

If the LU name in the printer definition does not match the name in *statement-name*, which is the secondary LU name, you must specify the same LU name as in the printer definition in this parameter, as shown in the second APPL statement in Figure 15 on page 214.

MODETAB=*table-name*

Specifies the name of a VTAM logon mode table to be used to associate each logon mode entry-name with a set of session parameters. If not specified, the default name is ISTINCLM.

DLOGMOD=*entry-name*

Specifies the name of an entry in the VTAM logon mode table that contains session parameters to be used when the primary LU does not provide other parameters. If this entry is used to establish the session parameters, this entry must specify correct LU type, FM profile, and TS profile parameters, as shown in Table 21 on page 216. If not specified, the default is the first entry in the VTAM logon mode table specified in the MODETAB parameter.

> **Note:** The *entry-name* must be in the VTAM logon mode table named in the MODETAB parameter or in the default table named ISTINCLM.

EAS=1   Specifies the number of active sessions for this printer. Always specify 1.

SESSLIM=YES

Specify YES to allow VTAM to queue pending sessions for the secondary LU, if the secondary LU already has an active session with another primary LU.

PARSESS=NO

Specifies that multiple sessions are not allowed. PARSESS=NO is the default, so it is not shown in the example.

Note: Do not code any APPC-related keywords.

For more information on the APPL statement, refer to *z/OS Communications Server: SNA Resource Definition Reference*.

If the APPL statement name or the ACBNAME name is the same as the LU name of an SNA-network printer, either remove the LU definitions for the SNA-network printers or deactivate the major node containing those LU statements.

Defining Resources for VTAM Applications

The resource definitions for your VTAM applications, such as CICS or IMS, must comply with the following requirements:

• A printer defined in the resource definition must contain a network name that matches the APPL statement name.
• The session parameters (BIND parameters) established for the printer must be valid, as shown in Table 21 on page 216.

- If you are using CICS, you must specify QUERY=NO on the TYPETERM macro for the printers.

Refer to the IMS or CICS publications related to resource definitions for information about defining resources.

Specifying Correct BIND Parameters

The VTAM BIND request that the VTAM application, the primary LU, issues to establish a session with a NetSpool printer LU, the secondary LU, must result in correct BIND parameters; that is:

- The LU type must be consistent with the type of print data to be sent during the session.
- The FM Profile and TS Profile values must be valid for that LU type.

Table 21 shows the valid combinations of the BIND parameters.

Table 21. VTAM BIND Parameter Requirements

Data Type	LU Type	FM Profile	TS Profile
3270 data	LU 0	2	2
3270 data	LU 3	3	3
SNA character string (SCS) data	LU 1	3 or 4	3 or 4

VTAM applications that establish sessions with NetSpool printer LUs can either use the BIND parameters in the logon mode table entry referred to in the APPL statement for the NetSpool printer LU, or the applications can override the BIND parameters, using their own resource definitions. In either case, the BIND parameters must be correct.

In most cases, CICS and IMS subsystems override the BIND parameters associated with the NetSpool printer LU with BIND parameters that are consistent with the type of data in the print requests. However, in one case, when an IMS application issues a BIND request, and the NetSpool printer LU logical printer is defined in IMS as a non-SNA 3270 device, IMS uses the BIND parameters specified for the NetSpool printer LU, without any changes. Therefore, in this instance, the BIND parameters for the NetSpool printer LU must be correct for a 3270 data stream, as shown in Table 21.

Chapter 16. Using ISPF Panels to Manage the Printer Inventory

This chapter describes how to use Infoprint Server ISPF panels to manage entries in the Printer Inventory. You can use ISPF panels to add, list, browse, copy, edit, and delete printer definitions, components, printer pool definitions, FSA definitions, and FSS definitions.

You can also use the Printer Inventory Definition Utility (PIDU) to manage entries in the Printer Inventory. The PIDU program can be useful for creating a large number of entries in the Printer Inventory. Also, you can use the PIDU program to create a backup copy of the Printer Inventory (see the **export** command). See Chapter 17, "Using the PIDU Program to Manage the Printer Inventory" on page 233 for information.

See Appendix B, "ISPF Panels" on page 373 for examples of some of the Infoprint Server ISPF panels.

When the Printer Inventory Manager is started, it creates the Printer Inventory files if they do not already exist in directory **/var/Printsrv** or in the directory specified in the **base-directory** statement of the Infoprint Server configuration file **aopd.conf**. To view the Printer Inventory files, use either the Infoprint Server ISPF panels or the PIDU program.

> **Note**
>
> In most cases you should not need to read this chapter. Instead, you can use the online help for each ISPF panel and field to find out how to use the panels and fill in a field. Read this chapter if you have difficulty using the panels to perform a task.

Starting the ISPF Session and Configuring the Panels

Before using the Infoprint Server ISPF panels, Infoprint Server must be started. The Printer Inventory Manger daemon, **aopd**, must be active; see "Starting Infoprint Server with the **aopstart** Command" on page 29 for information.

To run the Infoprint Server panels, you must (1) have READ access to the AOPADMIN resource profile in the RACF FACILITY class and (2) be a member of the AOPADMIN group. Refer to *z/OS Infoprint Server Customization* for more information about how to establish security for the Printer Inventory.

Displaying Infoprint Server Panels in Japanese

The ISPF panels are available in English and Japanese. To view Japanese panels, do the following:
- Define the code page to your 3270 emulator as IBM-939.
- When you start ISPF, enter: `ISPF Japanese`.
- Define the terminal type as 3270KN on the ISPF Settings panel.

Customizing CUA Attributes for ISPF Fields

Before you start using the Infoprint Server panels, you might want to customize your CUA (common user access) settings for ISPF fields. When you customize

CUA settings, values that are specified in components can be displayed in a different color from other values on the panels. This lets you quickly distinguish between values that are specified in components and custom values (that is, values specified in a printer definition itself) on those ISPF panels that display both types of values.

To customize your ISPF CUA settings, do the following:
1. On the ISPF Settings panel, select **Colors** from the action bar and then select **CUA attributes**.
2. Change an attribute, such as color, for **Choice Entry** fields so that it is different from the attribute for **Normal Entry** fields. Values from components are displayed with the attributes selected for **Choice Entry** fields, while other values are displayed with the attributes selected for the **Normal Entry** fields.

Displaying the Main Infoprint Server Panel

To display the main Infoprint Server panel:
1. On the ISPF Primary panel, select the **z/OS System** option.
2. On the z/OS System Programmer Primary Option panel, select the **Infoprint Server** option. The first panel is called the Infoprint Server: Printer Inventory Manager panel. If the z/OS System Programmer Primary Option panel does not contain the **Infoprint Server** option, ask your system programmer to customize your ISPF environment, as described in *z/OS Infoprint Server Customization*.
3. Before you use the panels for the first time, check the panel configuration. On the Infoprint Server: Printer Inventory Manager panel, select **7 Configure** and press Enter.
4. On the Configuration panel, fill in the fields to configure your panels. Your system programmer can change the default values that appear on this panel in file AOPINIT, as described in *z/OS Infoprint Server Customization*. Use the ISPF online help for information about each field. To save the new settings and exit the panel, press the END function key.

Defining an Infoprint Server Default Printer Definition

You can specify the name of a printer definition to be used as the default printer by the **lp** and **lpstat** commands and by the Print Interface subsystem. The default name is **lp1**.

The **PRINTER** and **LPDEST** environment variables override the default printer definition name for the **lp** command.

Follow these steps to specify a default printer definition:
1. On the Infoprint Server: Printer Inventory Manager panel, select **7 Configure** and Press Enter.
2. On the Configuration panel, fill in the **Default printer** field and press the END function key.
3. Add a printer definition with that name; see "Adding a Printer Definition" on page 219 for information.

Managing Printer Definitions

This section describes how to use the Infoprint Server ISPF panels to manage printer definitions. For information about how to specify attributes in a printer definition for the components of Infoprint Server that you plan to use, see the following chapters:

- Chapter 11, "Planning Printer Definitions for Print Interface" on page 93
- Chapter 12, "Planning Printer and Printer Pool Definitions for NetSpool" on page 121
- Chapter 13, "Planning Printer Definitions for IP PrintWay" on page 145
- Chapter 14, "Planning Printer Definitions for Infoprint Server Transforms" on page 201

Adding a Printer Definition

You can add a printer definition as described in this section. You can also add a printer definition by copying an existing printer definition of the same type. See "Copying a Printer Definition" on page 222 for information.

Follow these steps to add a printer definition:

1. On the Infoprint Server: Printer Inventory Manager panel, select **1 Add** and press Enter.

2. On the Choose a Definition Type and Protocol panel, select the type of printer definition and press Enter. Types are: IP PrintWay, PSF for OS/390, and General. If the type is IP PrintWay, also select the type of transmission protocol (LPR, direct sockets, IPP, VTAM, or e-mail). Depending on selected type and protocol, different ISPF panels are displayed. See "Selecting the Type of Printer Definition" on page 81 for information about the types of printer definitions.

3. On the IP PrintWay Printer Definition panel, the PSF for OS/390 Printer Definition panel, or the General Printer Definition panel:

   a. Fill in the printer definition name and other fields on this panel. To display online help information about how to use components and how to specify custom values, place the cursor on the command line and press the HELP function key. To display help information about each field, place the cursor on the input area of the field and press the HELP function key.

      To fill in the fields for each section of the printer definition (for example, the Allocation section), you can do one of the following:

      - Select a component that contains the attributes you want. To do this, place the cursor on the **Component Name** field for the section and press Enter. On the Component List panel, select the component name from the list and press Enter. If a component doesn't exist, create the component on the Component List panel.

        Note: Before you can save a printer definition that includes a component, all included components must exist in the Printer Inventory.

      - Fill in the fields in each section directly in this printer definition. To do this, place the cursor on the **Custom Values** field for the section and press Enter. On the next panel, fill in the fields and press the END function key to return to the Printer Definition panel. The fields you fill in are not saved in the inventory until you press the END function key from the Printer Definition panel.

      - Select a component, but also specify some fields directly in the printer definition. To do this, first select a component and then place the cursor

on the **Custom Values** field and press Enter. On the next panel, the values specified in the component are displayed in blue. If you specify a different value for a field, this value overrides the value in the component.

See table Appendix A, "Printer Attribute Tables" on page 363 for a list of the required and optional fields for NetSpool, IP PrintWay, and Print Interface.

From this panel, you can also create and manage all of the components for the different sections of the printer definition. To do this, place the cursor on the **Component Name** field for the section and press Enter. See "Managing Components" on page 224 for more information.

b. If you want to validate the fields before you save the printer definition, press Enter.

c. To save the new definition but keep the panel on the screen, type SAVE on the command line and press Enter.

   Hint: Type SAVE on the command line to easily add more than one printer definition of the same type.

d. To save the new definition and exit the panel, press the END function key.

Note: If you have already created some printer definitions, you can add a new printer definition by typing **A** in the **A column** on the Printer Definition List panel. See "Listing Printer Definitions" on page 221 for more information.

Adding Multiple Printer Definitions

To add more than one printer definition of the same type (IP PrintWay, PSF for OS/390, or General) at the same time, follow these steps:

1. Follow the instructions described in "Adding a Printer Definition" on page 219 or "Copying a Printer Definition" on page 222, and fill in the fields for the first printer definition.

2. To save the printer definition, type SAVE on the command line and press Enter. The printer definition panel remains on your screen. You can type SAVE from any of the printer definition panels.

3. Fill in the fields for the second printer definition. Specify a new printer definition name and change any other values.

   Note: You do not need to return to the main printer definition panel to change the name of the printer definition. Simply specify the new name in the **Printer definition name** field that is displayed at the top of each printer definition panel.

4. Type SAVE on the Command line to save the second printer definition, and repeat these steps.

Note: You can also use the Printer Inventory Definition Utility (PIDU) program to add many printer definitions at one time. First use the ISPF panels to create one printer definition of the desired type and protocol. Then use the PIDU **export** command to generate a PIDU **create** command for that printer definition. Replicate and edit the **create** command to create other printer definitions. See Chapter 17, "Using the PIDU Program to Manage the Printer Inventory" on page 233 for detailed information and examples.

Listing Printer Definitions

You must display a list of printer definitions before you can browse, copy, edit, delete, or change the type of a printer definition. You can list all printer definitions, or you can select the printer definitions you want to list.

Listing All Printer Definitions

Follow these steps to display a list of all printer definitions:

1. On the Infoprint Server: Printer Inventory Manager panel, select **2 List** and press Enter.

2. On the Printer Definition List panel, you can type one of the actions to perform the other functions described in this section. Press the END function key to exit the list. Press Enter at any time to obtain a current list.

Listing Selected Printer Definitions

You can select printer definitions based on one or more of the following criteria. Printer definitions are listed if they meet all of the criteria you specify.

- Name of the printer definition
- Type of printer definition: IP PrintWay, PSF for OS/390, or General
- Type of data formats the printer supports
- Location of the printer
- Destination associated with the printer definition
- Class associated with the printer definition
- Forms name associated with the printer definition
- Destination node associated with the printer definition
- Logical unit name for the printer definition

Follow these steps to display a list of selected printer definitions:

1. On the Infoprint Server: Printer Inventory Manager panel, select **3 Select** and press Enter.

2. On the Select Printer Definitions panel, type values in one or more fields to specify selection criteria and press Enter. The online help for each field tells you how to use an * or ? to represent one or more variable characters.

3. On the Printer Definition List panel, you can type an action in front of one or more printer definitions and press Enter. Press Enter at any time to obtain a current list.

4. Press the END function key to exit the list.

Note: To list all printer definitions that use a particular component, see "Listing Printer Definitions that Include a Component" on page 225.

Browsing a Printer Definition

When you browse a printer definition, you can view fields but you cannot change any of them. Follow these steps to browse the printer definition:

1. List the printer definition that you want to browse, as described in "Listing Printer Definitions".

2. On the Printer Definition List panel, type **B** in the **A** column in front of the printer definition you want to browse and press Enter.

3. On the Printer Definition panel:

   a. To view a component that is named in the printer definition, place the cursor on the component name and press Enter.

   b. To view all of the attributes for this printer definition, including the attributes specified in the component (if one is named in the **Component Name** field, place the cursor on the **Custom Values** field and press Enter.

c. To return to the Printer Definition List panel, press the END function key.

Copying a Printer Definition

To add a new printer definition, you can copy an existing definition and modify fields in the definition as necessary. To ensure that the correct fields are displayed on the ISPF panels, be sure to copy the same type of printer definition (IP PrintWay, PSF for OS/390, or General) as the one you want to add. If the printer definition is an IP PrintWay printer definition, also be sure to copy a printer definition that uses the same protocol (LPR, direct sockets, IPP, VTAM, or e-mail) as the one you want to add.

When you copy a printer definition, you can change any field; you must, however, change the **Printer Name** field.

Follow these steps to copy a printer definition:
1. List the printer definition you want to copy, as described in "Listing Printer Definitions" on page 221.
2. On the Printer Definition List panel, type **C** in the **A** column in front of the printer definition you want to copy and press Enter.
3. On the Printer Definition panel:
   a. Change the **Printer Name** field and any other field. To validate the fields, press Enter.
   b. To save the new printer definition, but maintain the panel on the screen, type SAVE on the command line and press Enter. You can now add additional printer definitions. To save the new definition and return to the Printer Definition List panel, press the END function key.

      Hint: Type SAVE on the command line to easily add more than one printer definition of the same type.
   c. To save the new definition and exit the panel, press the END function key.

Editing a Printer Definition

When you edit a printer definition, you can edit any field. Changes you make generally take effect for the next data set that NetSpool and Print Interface allocate on the JES spool and the next data set that IP PrintWay selects from the JES spool. Changes you make to a printer definition do not affect data sets in the process of being allocated on the JES spool or data sets retained on the JES spool after successful or failed transmission.

Changes to the NetSpool end-of-file rules and NetSpool LU class, however, are related to the VTAM session and do not take effect for the next data set allocated on the JES spool; see "Specifying How NetSpool Determines End-of-File" on page 139 and "Grouping NetSpool Printer LUs into LU Classes" on page 122 for information about when changes to these fields take effect.

If you change the name of a printer definition, the name is automatically changed in any printer pool definition that lists the printer definition.

Note: To change the protocol type in an IP PrintWay printer definition, see "Changing the Type of a Printer Definition or the IP PrintWay Protocol Type" on page 223.

Follow these steps to edit a printer definition:

1. List the printer definition you want to edit, as described in "Listing Printer Definitions" on page 221.
2. On the Printer Definition List panel, type **E** in the **A** column in front of the printer definition whose fields you want to edit, and press Enter.
3. On the Printer Definition panel:
    a. Change any field on the panels. To validate the fields, press Enter.
    b. To save the printer definition but maintain the panel on the screen, type SAVE on the command line and press Enter. To save the printer definition and return to the Printer Definition List panel, press the END function key.

Deleting a Printer Definition

When you delete a printer definition, the printer definition is removed from the Printer Inventory. If a printer pool definition contains the printer definition, the printer definition is automatically removed from the printer pool definition. Follow these steps to delete a printer definition:

1. List the printer definition you want to delete, as described in "Listing Printer Definitions" on page 221.
2. On the Printer Definition List panel, type **D** in the **A** column in front of the printer definition you want to delete and press Enter.
3. On the Confirm Delete panel, press Enter to delete the printer definition. Press the END function key to cancel the delete request.

Changing the Type of a Printer Definition or the IP PrintWay Protocol Type

Follow these steps to change the type of the printer definition or to change the type of protocol that IP PrintWay uses to transmit data to the printer. The printer definition types are: IP PrintWay, PSF for OS/390, or General. The IP PrintWay protocol types are: LPR, direct sockets, IPP, VTAM, and e-mail.

1. List the printer definition you want to change, as described in "Listing Printer Definitions" on page 221.
2. On the Printer Definition List panel, type **X** in the **A** column in front of the printer definition you want to change and press Enter.
3. On the Choose a Definition Type and Protocol panel, select the printer definition type and the protocol type. Press Enter.
4. If you selected an IP PrintWay type, the Protocol panel is displayed. On the Protocol panel, specify the required fields for the type of protocol and save the printer definition.

    Before you save the printer definition, ensure that the following fields are correct on the Processing panel:

    - **Printer code page**: For the LPR, direct sockets, and IPP protocols, specify an ASCII code page. For the VTAM and e-mail protocols, specify an EBCDIC code page.
    - **Filter** field for the **Text** data format: For the LPR, direct sockets, and IPP protocols, specify either the **aopfiltr.so** or **lpd_compat.so** filter. For the VTAM and e-mail protocols, do *not* specify either of these filters.

5. If you selected either PSF for OS/390 or General type, the Printer Definition List panel is displayed. If you need to edit any fields in the printer definition, type **E** in the **A** column in front of the printer definition. If you changed the type from IP PrintWay to either PSF for OS/390 or General, ensure that the following fields are correct on the Processing panel:
    - **Printer code page**: Specify an EBCDIC code page.

- **Filter** field for the **Text** data format: Do *not* specify the **aopfiltr.so** filter.

Testing a Printer Definition

The ISPF panels check the validity of many of the values you specify in the fields of a printer definition. However, to check the validity of all fields, for example to verify the IP address of the remote printer, print a file to the printer named in the printer definition. If IP PrintWay finds an error, it issues a message to the IP PrintWay message log. If NetSpool finds an error, it issues a message to the NetSpool message log if one exists.

If you have configured data transforms, print data of each format to the printer definition.

Managing Components

This section describes how to use Infoprint Server ISPF panels to manage components. A component contains attributes that are common to several printer definitions. You can define one or more components for each section of a printer definition, such as the Allocation section and the Processing section. See "Including Components in Printer Definitions" on page 85 for more information about components and when you might want to create them.

See "Customizing CUA Attributes for ISPF Fields" on page 217 for information about how to customize your ISPF settings so that values that you specify in components are displayed in different colors on ISPF panels.

Listing Components

You must obtain a list of components before you can add, copy, edit, rename, or delete a component. Follow these steps to obtain a list of components:

1. Add, edit, or copy any printer definition, as described in "Adding a Printer Definition" on page 219, "Copying a Printer Definition" on page 222 or "Editing a Printer Definition" on page 222.

2. On the Printer Definition panel:

   a. If you are adding a printer definition, specify a printer definition name.

   b. Place the cursor on the **Component Name** field for one section of the printer definition, for example, the Allocation section, and press Enter.

3. The Component List panel displays all of the components for the section. On this panel, you can type an action in the **A** column to perform the other functions described in this section. Press the END function key to return to the Printer Definition panel.

4. Type CANCEL on the command line of the Printer Definition panel, unless you want to add, edit, or copy the printer definition.

Adding a Component

You can add a component of a printer definition as described in this section; however, you can also add components by copying an existing component. See "Copying a Component" on page 225 for information.

Follow these steps to add a component:

1. List the components for the section of the printer definition, for example, the Allocation section, as described in "Listing Components".

2. On the Component List panel, type **add** on the command line and press Enter.

3. On the next panel:
   a. Type a component name in the **Component name** field. The components for the same section must have unique names; however components for different sections can have the same name. For example, an Allocation component and a Processing component can have the same name.
   b. Specify any other attributes; you can leave blank the fields that you want to specify in the printer definitions that include this component. In the printer definitions that include the component, you can override any attributes specified in the component and you can specify attributes that are left blank in the component. To validate the fields, press Enter.
   c. To save the new component but keep the panel on the screen, type SAVE on the command line and press Enter. To save the new component and return to the Component List panel, press the END function key.

      Hint: Type SAVE on the command line to easily add more than one component of the same type.
   d. To save the new component and exit the panel, press the END function key.

Listing Printer Definitions that Include a Component

Follow these steps to list the printer definitions that include a particular component:

1. List the components for the section of the printer definition, as described in "Listing Components" on page 224.
2. On the Component List panel, type **P** in the **A** column in front of the component name and press Enter.
3. The Printer Definition List panel displays a list of printer definitions that include the component. On this panel, you can add, edit, browse, copy, those printer definitions. Press the END function key to return to the Component List panel.

Browsing a Component

When you browse a component, you can view fields but you cannot change any of them. Follow these steps to browse any component:

1. List the components for the section of the printer definition as described in "Listing Components" on page 224.
2. On the Component List panel, type **B** in the Action column next to the components you want to browse and press Enter.
3. The next panel displays the component. Press the END function key to return to the Component List panel.

Copying a Component

You can add a new component by copying an existing component to a new component and changing the name and any other fields. Because the components for each section of a printer definition, for example the Allocation section, contain different fields, be sure to copy the correct type of component.

Follow these steps to copy a component:

1. List the components for the section of the printer definition as described in "Listing Components" on page 224.
2. On the Component List panel, type **C** in the **A** column in front of the component you want to copy and press Enter.
3. On the next panel:

a. Change the **Component Name** field and any other field. To validate the fields, press Enter.

b. To save the new component, but keep the panel on the screen, type SAVE on the command line and press Enter. To save the new definition and return to the Component List panel, press the END function key.

   Hint: Type SAVE on the command line to easily add more than one component of the same type.

c. To save the new component and exit the panel, press the END function key.

Editing a Component

When you edit a component, you can edit any field. The changes you make take effect for all printer definitions that include that component. Therefore, before editing a component, you might want to list the printer definitions that include the component.

If you change the name of a component, the component name is automatically changed in all printer definitions and printer pool definitions that include that component.

Follow these steps to edit a component:

1. List the components for the section of the printer definition as described in "Listing Components" on page 224.

2. On the Component List panel, type **E** in the **A** column in front of the components you want to edit and press Enter.

3. On the next panel:

   a. Change any field on the panels. To validate the fields, press Enter.

   b. To save the component, but keep the panel on the screen, type SAVE on the command line and press Enter. To save the component and return to the Component List panel, press the END function key.

   c. To save the component and exit the panel, press the END function key.

Renaming a Component

Follow these steps to rename a component and also change the component name in all printer definitions and printer pool definitions that include the component:

1. List the components for the section of the printer definition as described in "Listing Components" on page 224.

2. On the Component List panel, type **R** in the **A** column in front of the component you want to rename and press Enter.

3. On the Enter the New Component Name panel, type the new name and press Enter. Press the END function key to cancel the rename request.

Deleting a Component

You can delete a component only if no printer definitions or printer pool definitions include that component. You can use the procedure described in "Listing Printer Definitions that Include a Component" on page 225 to determine whether any printer definition include the component to be deleted.

Follow these steps to delete a component:

1. List components as described in "Listing Components" on page 224.

2. On the Component List panel, type **D** in the **A** column in front of the components you want to delete and press Enter.

3. On the Confirm Delete panel, press Enter to delete the component, or press the END function key to cancel the delete request.

Managing Printer Pool Definitions

This section describes how to use the Infoprint Server ISPF panels to manage printer pool definitions. A printer pool definition is used by NetSpool to broadcast data to several printer definitions. See "Planning Printer Pool Definitions" on page 88 for more information about printer pool definitions and when you might want to create them.

Adding a Printer Pool Definition

You can add a printer pool definition as described in this section. You can also add a printer pool definition by copying an existing printer pool definition. See "Browsing, Copying, Editing, and Deleting a Printer Pool Definition" on page 228 for information.

Before you add a printer pool definition, create the printer definitions for the printers in the pool, if necessary.

Follow these steps to add a printer pool definition:

1. On the Infoprint Server: Printer Inventory Manager panel, select **4 FSA/FSS/Pool** and press Enter.

2. On the FSA, FSS, and Pool Management panel, select **7 Add** and press Enter.

3. On the Printer Pool panel:

   a. To display online help information about how to use the panel, place the cursor on the command line and press the HELP function key. To display help information about each field, place the cursor on the input area of each field and press the HELP function key.

   b. Fill in the **LU name** field and the **Printer definition names** fields. To select the names of the printer definitions from a list, place the cursor on the word **list** and press Enter.

   If a printer definition does not exist, you can create it from the list panel. Before you can save a printer pool definition, all printer definitions listed in the printer pool definition must exist in the Printer Inventory.

   The order in which printer definition names are listed is significant. NetSpool uses formatting attributes in the printer definition that you list *first*.

   c. Other fields on the Printer Pool panel are optional. See "Broadcasting Data Using Multiple Printer Definitions" on page 142 for more information about which fields to specify in printer pool definitions.

   d. To validate the fields before you save the printer pool definition, press Enter.

   e. To save the new definition but keep the panel on the screen, type SAVE on the command line and press Enter.

   f. To save the new definition and exit the panel, press the END function key.

Note: If you have already created some printer definitions, you can add a new printer definition by typing **A** in the **A** column on the Printer Definition List panel. See "Listing Printer Definitions" on page 221 for more information.

Listing Printer Pool Definitions

You must display a list of printer pool definitions before you can browse, copy, edit, or delete a printer pool definition. You can list all printer pool definitions, or you can select the printer pool definitions you want to list.

Listing All Printer Pool Definitions

Follow these steps to display a list of all printer pool definitions:

1. On the Infoprint Server: Printer Inventory Manager panel, select **4 FSA/FSS/Pool** and press Enter.

2. On the FSA, FSS, and Pool Management panel, select **8 List** and press Enter.

3. On the Pool List panel, you can type one of the actions to perform the other functions described in this section. Press the END function key to exit the list. Press Enter at any time to obtain a current list.

Listing Selected Printer Pool Definitions

You can select printer pool definitions based on one or more of the following criteria. Printer pool definitions are listed if they meet all of the criteria you specify.

- Name of the printer pool definition
- NetSpool logical-unit (LU) name
- Description of the printer pool definition
- LU class
- NetSpool End-of-File component name
- Names of printer definitions in the pool

Follow these steps to display a list of selected printer pool definitions:

1. On the Infoprint Server: Printer Inventory Manager panel, select **4 FSA/FSS/Pool** and press Enter.

2. On the FSA, FSS, and Pool Management panel, select **9 Select** and press Enter.

3. On the Select Pool panel, type values in one or more fields to specify selection criteria and press Enter. The online help for each field tells you how to use an * or ? to represent one or more variable characters.

4. On the Pool List panel, you can type an action in front of one or more printer definitions and press Enter. Press Enter at any time to obtain a current list.

5. Press the END function key to exit the list.

Browsing, Copying, Editing, and Deleting a Printer Pool Definition

Follow these steps to browse, copy, edit, or delete the printer pool definition:

1. List the printer definition that you want to work with, as described in "Listing Printer Pool Definitions".

2. On the Pool List panel, type **B**, **C**, **E**, or **D** in the **A** column in front of the printer pool definition you want to work with and press Enter.

3. To return to the Pool List panel, press the END function key.

Managing FSS Definitions

This section describes how to use the Infoprint Server ISPF panels to manage FSS (functional subsystem) definitions. See "Planning FSS Definitions" on page 89 for more information about FSS definitions and when you might want to create them.

Adding an FSS Definition

You can add an FSS definition as described in this section. You can also add an FSS definition by copying an existing FSS definition of the same type. See "Browsing, Copying, Editing, and Deleting an FSS Definition" on page 230 for information.

Follow these steps to add an FSS definition:

1. On the Infoprint Server: Printer Inventory Manager panel, select **4 FSS/FSA/Pool** and press Enter.
2. On the FSA, FSS, and Pool Management panel, select **4 Add**.
3. On the Choose an FSS type to add panel, select the type of FSS definition and press Enter. Types are: IP PrintWay and PSF for OS/390. Depending on the type you select, different ISPF panels are displayed.
4. On the IP PrintWay FSS panel or the PSF for OS/390 FSS panel:
   a. Fill in the FSS name and other fields on this panel. The FSS name must match the name of the FSS as defined to JES. To display online help information place the cursor on the command line and press the HELP function key. To display help information about each field, place the cursor on the input area of the field and press the HELP function key.
   b. To validate the fields before you save the FSS definition, press Enter.
   c. To save the new definition but keep the panel on the screen, type SAVE on the command line and press Enter.

      Hint: Type SAVE on the command line to easily add more than one FSS definition of the same type.

   d. To save the new definition and exit the panel, press the END function key.

Note: If you have already created some FSS definitions, you can add a new FSS definition by typing **A** in the **A column** on the FSS Definition List panel. See "Listing FSS Definitions" for more information.

Listing FSS Definitions

You must display a list of FSS definitions before you can browse, copy, edit, or delete an FSS definition. You can list all FSS definitions, or you can select the FSS definitions you want to list.

Listing All FSS Definitions

Follow these steps to display a list of all FSS definitions:

1. On the Infoprint Server: Printer Inventory Manager panel, select **4 FSA/FSS/Pool** and press Enter.
2. On the FSA, FSS, and Pool Management panel, select **5 List** and press Enter.
3. On the FSS List panel, you can type one of the actions to perform the other functions described in this section. Press the END function key to exit the list. Press Enter at any time to obtain a current list.

Listing Selected FSS Definitions

You can select FSS definitions to list based on one or more of the following criteria. FSS definitions are listed if they meet all of the criteria you specify.
- FSS name
- Description of the FSS definition
- Type of FSS definition: IP PrintWay or PSF for OS/390

Follow these steps to display a list of selected FSS definitions:

1. On the Infoprint Server: Printer Inventory Manager panel, select **4 FSA/FSS/Pool** and press Enter.
2. On the FSA, FSS, and Pool Management panel, select **6 Select** and press Enter.
3. On the FSS Select panel, type values in one or more fields to specify selection criteria and press Enter. The online help for each field tells you how to use an * or ? to represent one or more variable characters.
4. On the FSS List panel, you can type an action in front of one or more printer definitions and press Enter. Press Enter at any time to obtain a current list.
5. Press the END function key to exit the list.

Browsing, Copying, Editing, and Deleting an FSS Definition

Follow these steps to browse, copy, edit, or delete a FSS definition:

1. List the FSS definition that you want to work with, as described in "Listing FSS Definitions" on page 229.
2. On the FSS List panel, type **B**, **C**, **E**, or **D** in the **A** column in front of the FSS definition you want to work with and press Enter.
3. To return to the FSS List panel, press the END function key.

Managing FSA Definitions

This section describes how to use the Infoprint Server ISPF panels to manage FSA (functional subsystem application) definitions. See "Planning FSA Definitions" on page 90 for more information about FSA definitions and when you might want to create them.

Adding an FSA Definition

You can add an FSA definition as described in this section. You can also add an FSA definition by copying an existing FSA definition of the same type. See "Browsing, Copying, Editing, and Deleting an FSA Definition" on page 231 for information.

Follow these steps to add an FSA definition:

1. On the Infoprint Server: Printer Inventory Manager panel, select **4 FSS/FSA/Pool** and press Enter.
2. On the FSA, FSS, and Pool Management panel, select **1 Add**.
3. On the Choose an FSA type to add panel, select the type of FSA definition and press Enter. Types are: IP PrintWay, PSF for OS/390 channel, PSF for OS/390 SNA, and PSF for OS/390 TCP/IP. Depending on the type you select, different ISPF panels are displayed.
4. On the IP PrintWay FSA panel or the PSF for OS/390 FSA panel:
   a. Fill in the FSA name and other fields on this panel. The FSA name must match the name of the FSA as defined to JES. To display online help information place the cursor on the command line and press the HELP function key. To display help information about each field, place the cursor on the input area of the field and press the HELP function key.
   b. To validate the fields before you save the FSA definition, press Enter.
   c. To save the new definition but keep the panel on the screen, type SAVE on the command line and press Enter.

> **Hint:** Type SAVE on the command line to easily add more than one FSA
> definition of the same type.

    d. To save the new definition and exit the panel, press the END function key.

> **Note:** If you have already created some FSA definitions, you can add a new FSA
> definition by typing **A** in the **A column** on the FSA Definition List panel. See
> "Listing FSA Definitions" for more information.

Listing FSA Definitions

You must display a list of FSA definitions before you can browse, copy, edit, or
delete an FSA definition. You can list all FSA definitions, or you can select the FSA
definitions you want to list.

Listing All FSA Definitions
Follow these steps to display a list of all FSA definitions:

1. On the Infoprint Server: Printer Inventory Manager panel, select **4
   FSA/FSS/Pool** and press Enter.
2. On the FSA, FSS, and Pool Management panel, select **2 List** and press Enter.
3. On the FSA List panel, you can type one of the actions to perform the other
   functions described in this section. Press the END function key to exit the list.
   Press Enter at any time to obtain a current list.

Listing Selected FSA Definitions
You can select FSA definitions to list based on one or more of the following criteria.
FSA definitions are listed if they meet all of the criteria you specify.
- FSA name
- Description of the FSA definition
- Type of FSA definition: IP PrintWay, PSF for OS/390 channel, PSF for OS/390
  SNA, or PSF for OS/390 TCP/IP.

Follow these steps to display a list of selected FSA definitions:

1. On the Infoprint Server: Printer Inventory Manager panel, select **4
   FSA/FSS/Pool** and press Enter.
2. On the FSA, FSS, and Pool Management panel, select **3 Select** and press
   Enter.
3. On the FSA Select panel, type values in one or more fields to specify selection
   criteria and press Enter. The online help for each field tells you how to use an *
   or ? to represent one or more variable characters.
4. On the FSA List panel, you can type an action in front of one or more printer
   definitions and press Enter. Press Enter at any time to obtain a current list.
5. Press the END function key to exit the list.

Browsing, Copying, Editing, and Deleting an FSA Definition

Follow these steps to browse, copy, edit, or delete a FSA definition.

1. List the FSA definition that you want to work with, as described in "Listing FSS
   Definitions" on page 229.
2. On the FSA List panel, type **B**, **C**, **E**, or **D** in the **A** column in front of the FSA
   definition you want to work with and press Enter.
3. To return to the FSA List panel, press the END function key.

> **Note:** When you edit values in an FSA definition, you need to restart the IP
> PrintWay FSA or PSF printer for your changes to take effect.

Chapter 17. Using the PIDU Program to Manage the Printer Inventory

This chapter describes how to use the Printer Inventory Definition Utility (PIDU) program to manage objects in the Printer Inventory. Inventory objects include printer definitions, printer pool definitions, components, FSS definitions, and FSA definitions.

Instead of using the PIDU program, you can use Infoprint Server ISPF panels to manage objects in the Printer Inventory. The ISPF panels display Inventory objects in a readable format, check for required attributes, and provide defaults for some attributes.

However, you might find the PIDU program useful for creating and editing many objects at the same time. Also, the PIDU program lets you perform some functions that you cannot perform with Infoprint Server ISPF panels. For example, you can export and dump Inventory objects to a file, and you can perform more powerful searches of the Printer Inventory.

Before running the PIDU program, Infoprint Server must be started. The Printer Inventory Manger daemon (**aopd)** must be active. Other Infoprint Server daemons, IP PrintWay, and NetSpool can also be active when you use the PIDU program.

To run the PIDU program, you must (1) have READ access to the AOPADMIN resource profile in the RACF FACILITY class and (2) be a member of the AOPADMIN group. Refer to *z/OS Infoprint Server Customization* for more information about how to establish security for the Printer Inventory.

When the Printer Inventory Manager is started, it creates the Printer Inventory files if they do not already exist in directory **/var/Printsrv** or in the directory specified in the **base-directory** statement of the Infoprint Server configuration file **aopd.conf**. To view the Printer Inventory files, use either the Infoprint Server ISPF panels or the PIDU program.

Running the PIDU Program

You can run the PIDU program in two ways:
- From the z/OS UNIX shell using the **pidu** command; see "Running the PIDU Program Using the **pidu** Command".
- As a batch job; see "Running the PIDU Program as a Batch Job" on page 236.

Running the PIDU Program Using the pidu Command

Format
pidu [-qv] [-c "*command* ..."]... **[***filename***]...**

Description
The **pidu** command lets you specify one or more of the PIDU commands shown in Table 22 on page 238 to manage objects in the Printer Inventory. You can specify PIDU commands in the **-c** option or in a file. The **pidu** command writes a report of errors to standard error (**stderr**) and writes informational messages and command output to standard output (**stdout**).

Options

-c '*command* **...**'

Specifies one or more PIDU commands. Enclose the statements in single or double quotes, and end each statement with a semicolon. You can repeat this option.

If you do not specify the **-c** option or the name of a file, **pidu** reads the commands from standard input (**stdin**), which can be either keyboard data or output from another command.

You can specify the following PIDU commands:
- create
- delete
- display
- dump
- export
- force-create
- list
- modify
- rename

For detailed information about these commands, see "PIDU Commands" on page 238.

-q

Suppresses informational messages that the **pidu** command writes to **stdout**.

-v

Writes the name of the Printer Inventory to **stderr**. Also provides additional informational messages.

Operands

filename

The name of a UNIX file or sequential MVS data set that contains the commands. You can repeat this option.

If the data set is an MVS data set, specify **//** before the filename. If you specify a fully qualified data set name, also enclose the data set name in single quotes and code a backslash before each single quote. For example, if the output file is named USERID.MYFILE, enter:

```
//\'USERID.MYFILE\'
```

If you want your TSO user ID prefixed to the data set name, specify:

```
//MYFILE
```

To specify commands from **stdin**, omit the file name and the **-c** option.

Usage Notes

- You can specify PIDU commands interactively from your keyboard. See "Entering PIDU Commands Interactively" on page 235 for an example.
- When you specify PIDU commands in a file, the following considerations apply:
  - Start comments with: #
  - Include blank lines if desired.

Examples

Entering PIDU Commands Interactively: To enter one or more PIDU commands interactively from your keyboard:

1. On the z/OS UNIX command line, type `pidu` and press Enter.

2. Type a PIDU command and press enter. For example, to create a printer definition, type:

```
create printer lp1 description="Default printer - IBM NP17"
 location="Printer room" printer-type=ip-printway dcf-routing=yes
 destination=LP1 printer-ip-address=printer1.boulder luname=LUPRT001
 lu-classes={2} include-allocation=printway
 include-processing = pcl_printer include-printway-options=pcl_land_17cpi
 include-netspool-eof-rules=bracket include-netspool-options=pcl
 include-protocol=lpr_options ;
```

   For an explanation of this **create** command, see "Creating an IP PrintWay Printer Definition for a PCL Printer with LPR Protocol" on page 245.

3. After the command is processed, type another command and press enter. For example, to display the attributes of the printer definition just created, enter:

```
display printer lp1;
```

4. After the command is processed, use **Ctrl-D** or type **exit** to end the **pidu** command.

Specifying PIDU Commands on the Command Line: To specify two PIDU **list** commands with the **-c** option, enter:

```
pidu -c "list printer; list printer-pool;"
```

Specifying PIDU Commands in a File: To specify a UNIX file named **pidu.commands** that contains PIDU commands, enter:

```
pidu pidu.commands
```

You can also use the < symbol to redirect **stdin** to file **pidu.commands** and enter:

```
pidu <pidu.commands
```

To specify a fully qualified MVS data set named MARY.PIDU.CMDS, enter:

```
pidu //\'MARY.PIDU.CMDS\'
```

If you want your TSO user ID prefixed to the data set name, enter:

```
pidu //PIDU.CMDS
```

File **pidu.commands** (or data set PIDU.CMDS) contains the PIDU commands, for example:

```
create printer lp1 description="Default printer - IBM NP17"
 location="Printer room" printer-type=ip-printway dcf-routing = yes destination=LP1
 printer-ip-address=printer1.boulder luname = LUPRT001 lu-classes={ 2 }
 include-allocation=printway include-processing=pcl_printer
 include-printway-options=pcl_land_17cpi include-netspool-options=pcl
 include-netspool-eof-rules=bracket include-protocol=lpr_options ;
list printer;     # List all printer definitions
```

Environment Variables

AOPCONF   Names the Infoprint Server configuration file. The file named in this variable takes precedence over the user-specific configuration file, **$HOME/.aopconf**, and the system default configuration file, **/etc/Printsrv/aopd.conf**.

LIBPATH	Lists the directory where the Infoprint Server DLLs are located.
NLSPATH	Lists the directory where the Infoprint Server message catalogs are located.
PATH	Lists the directory where the Infoprint Server executables are located.

Files

$HOME/.aopconf

Contains the user-specific Infoprint Server configuration file. This file takes precedence over **/etc/Printsrv/aopd.conf**.

/etc/Printsrv/aopd.conf

The default Infoprint Server configuration file. This file is optional.

Exit Values

0 The PIDU commands were performed successfully.

>0 An error occurred that prevented one or more PIDU commands from being performed successfully.

Running the PIDU Program as a Batch Job

You can run the PIDU program as a batch job from TSO by using either the AOPBATCH program or the BPXBATCH utility program. IBM recommends using the AOPBATCH program.

Using AOPBATCH to run the PIDU Program

You can invoke AOPBATCH in JCL with the following EXEC statement:

```
//stepname EXEC PGM=AOPBATCH,PARM='pidu [-v] [-q]'
```

where:

-q Suppresses informational messages that the **pidu** command writes to the output data set named in the STDOUT DD statement.

-v Writes the name of the Printer Inventory to the output data set named in the STDERR DD statement. Also provides additional informational messages.

You can specify the following DD statements:

STDENV	Specifies environment variables used by the PIDU program. You can specify the environment variables either in-stream or in a UNIX file or MVS data set. See "Environment Variables" on page 235 for the environment variables used by the PIDU program. When you use AOPBATCH, you need to specify the PATH, LIBPATH, and NLSPATH environment variables only if your installation did not install Infoprint Server files in the default directories. Specify the AOPCONF environment variable if the Infoprint Server configuration file is not in **/etc/Printsrv/aopd.conf** or in **$HOME/.aopconf**. Specify the environment variables in the format *variable* = *value*.
STDERR	Specifies a SYSOUT data set, a UNIX file, or an MVS data set. The PIDU program writes error messages to this file or data set.
STDIN	Specifies PIDU commands in-stream or names a UNIX file or MVS data set that contains the commands.

STDOUT   Specifies a SYSOUT data set, a UNIX file, or an MVS data set. The
                PIDU program writes its output and informational messages to this
                file or data set.

IBM provides sample JCL in the AOPPIDU member of SYS1.SAMPLIB for running
the PIDU program using the AOPBATCH utility. Figure 16 shows member
AOPPIDU.

```
//AOPPIDU  JOB ,'pidu'
//*
//PIDU     EXEC PGM=AOPBATCH,PARM='pidu'
//*
//STDIN    DD  DSN=hlq.INVDEFS,DISP=SHR
//*
//STDOUT   DD  SYSOUT=*
//STDERR   DD  SYSOUT=*
//*
//* STDENV may point to a dataset containing environment variables.
//*       Builtin values will work for the default installation.
//*STDENV   DD  DSN=environment,DISP=SHR
```

*Figure 16. Sample JCL for Running the PIDU Program as a Batch Job —
SYS1.SAMPLIB(AOPPIDU)*

Example: This example lists all printer definitions and printer pool definitions, and
specifies environment variables in-stream in the JCL.

```
//AOPPIDU  JOB ...
//PIDU     EXEC PGM=AOPBATCH,PARM='pidu'
//STDIN    DD  *
list printer;
list printer-pool;
/*
//STDOUT   DD  SYSOUT=*
//STDERR   DD  SYSOUT=*
//STDENV   DD  *
PATH=/usr/mylib/Printsrv/bin
LIBPATH=/usr/mylib/Printsrv/lib
NLSPATH=/usr/mylib/Printsrv/%L/%N
/*
```

Note: If your installation installed Infoprint Server files in default directories, then
           you can omit the STDENV DD statement.

Using BPXBATCH to Run the PIDU Program
If you use the BPXBATCH utility program to run the **pidu** command, you must
always set the PATH, LIBPATH, and NLSPATH environment variables, even if your
installation installed Infoprint Server files in default locations. Specify the AOPCONF
environment variable if the Infoprint Server configuration file is not in
/etc/Printsrv/aopd.conf or in **$HOME/.aopconf**. See "Environment Variables" on
page 235 for information about these environment variables.

Refer to *z/OS UNIX System Services Command Reference* for information about
the BPXBATCH utility program.

PIDU Commands

As input to the PIDU program, you must specify one or more PIDU commands. Table 22 summarizes the PIDU commands, the function of each command, and where to find more information about the command.

Table 22. Summary of PIDU Commands

PIDU Command	Function of Command	See Page:
create	Create a new object.	240
delete	Delete an object.	252
display	Display the attributes of an object.	252
dump	Dump all objects.	253
export	Generate **create** commands for all objects or only objects that meet certain criteria.	254
force-create	Create an object and replace an object of the same name and in the same obejct class if it exists.	240
list	List all objects or only objects that meet certain criteria.	256
modify	Modify attributes of an object.	257
rename	Rename an object.	259

Note: To abbreviate command names, use enough characters to make the command name unique. For example, you can abbreviate **display** as **di**.

PIDU Object Classes

Most PIDU commands require that you identify the *object class* of the Inventory object you want to work with. Table 23 summarizes how the PIDU program classifies Inventory objects.

Table 23. Classes of Objects used by the PIDU Program

Object Class	Description of Object
allocation	An Allocation component
fsa	An FSA definition
netspool-eof-rules	A NetSpool End-of-File component
netspool-options	A NetSpool Options component
printer	A printer definition
printer-pool	A printer pool definition
printway-fss	An FSS definition for an IP PrintWay functional subsystem
printway-options	An IP PrintWay Options component
processing	A Processing component
protocol	A Protocol component
psf-fss	An FSS definition for a PSF for OS/390 functional subsystem

Where Predicate

Two of the PIDU commands, **export** and **list**, let you construct a **where** predicate to select the objects you want to export or list. In the **where** predicate, you can specify one or more conditions.

The **where** predicate has the following format:

where *condition* **[and|or** *condition***]...**

A condition has the following format:

[not] *attribute operator value*

where:

not   Indicates that the evaluation of the condition is to be reversed.

attribute   Specifies the name of a **single-valued** attribute that is valid for the object class. Note that **multi-valued** attributes are not supported.

        You can specify any attribute that is valid for the object class; you can also specify the attribute **name** to limit definitions by name. See "Attribute Listing" on page 262 for a list of the valid attributes.

operator   Specifies one of the operators shown in Table 24.

value   Specifies the value of the attribute. All values are case sensitive; therefore, be sure to type the same uppercase and lowercase letters as are stored in the Printer Inventory. The special value **null** means that an attribute is not specified.

        If you use the **match** operator, you must specify a regular expression as defined in the "Regular Expressions" appendix in *z/OS UNIX System Services Command Reference*.

        If the value contains special characters (such as * { } - >), enclose the value in quotation marks.

Table 24 summarizes the operators that you can use when you construct a condition. Some operators are valid only for certain types of attribute values, as indicated in the table. For example, you can use the **match** operator only for attributes that accept strings values.

Table 24. Operators for Attributes

Operator	Operation	String Values	Fixed Values	Integer Values
=	Equal	Yes	Yes	Yes
!=	Not equal	Yes	Yes	Yes
>	Match a value greater than the specified value	Yes[1]	No	Yes
<	Match a value less than the specified value	Yes[1]	No	Yes
<=	Match a value less than or equal to the specified value	Yes[1]	No	Yes
>=	Match a value greater than or equal to the specified value	Yes[1]	No	Yes

Table 24. Operators for Attributes (continued)

Operator	Operation	String Values	Fixed Values	Integer Values
match	Match the specified regular expression	Yes[1]	No	No

1. A string value is evaluated using binary collation.

To specify an expression with multiple conditions, separate the conditions with one of the following operators:

and The expression is true only if both conditions are true.

or The expression is true if either condition is true.

Multiple conditions are evaluated using an order of precedence, with **and** conditions evaluated before **or** conditions. You can override the order by using parentheses; expressions within parentheses are evaluated first.

Note: For examples of the **where** predicate, see
- "export—Export Objects in the Printer Inventory to a File" on page 254
- "list—List Names of Objects in the Printer Inventory" on page 256

create and force-create—Create an object in the Printer Inventory

Format
create *objectclass name* [*attribute = value*]... ;

force-create *objectclass name* [*attribute = value*]... ;

Description
The **create** command creates a printer definition, component, printer-pool definition, FSS definition, or FSA definition in the Printer Inventory. The Inventory object must not already exist in the Printer Inventory.

The **force-create** command performs the same function as the **create** command except that if an object of the same name and in the same object class exists, it is replaced.

Operands
objectclass The class of the object that you want to create. Valid values are: **allocation, fsa, netspool-eof-rules, netspool-options, printway-fss, psf-fss, printer, printer-pool, printway-options, processing**, and **protocol**. See Table 23 on page 238 for a description of these object classes.

name A name to identify the object. Objects in the same object class cannot have the same name. Also, a printer pool definition (**printer-pool** object class) cannot have the same name as a printer definition (**printer** object class).

When you create a printer definition, printer-pool definition, or component, specify any combination of 1-17 letters (a-z, A-Z), numbers (0-9), and special characters (such as $ # @ . - = /). Blank characters are not allowed. In an IP PrintWay printer definition, use name DFLTNTRY to designate the IP PrintWay default printer definition. The name is case sensitive.

When you create an FSS or FSA definition, this name must match the name used to define the FSA or FSS to JES. Specify a valid combination of 1-8 letters, numbers, and national characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. Lowercase letters are converted to uppercase.

If the name contains special characters, enclose the name in single or double quotation marks.

attribute = value

One or more attributes and values. Separate attributes with spaces. See "Attribute Listing" on page 262 for the valid attributes for each object class.

Usage Notes

- A printer definition can include one or more components. For example, a printer definition can include one Allocation component and one Processing component. When a printer definition includes a component, the attributes specified for the component apply to the printer definition as well. To include a component, use the **include-*object*** attributes, such as **include-allocation** and **include-processing**.

- When you create a printer definition and include components, you can override any attribute that is specified in a component. To do this, specify the same attribute on the **create** statement for the printer definition. The attribute you specify on the **create** statement applies only to the printer definition; the value of the attribute in the component is not changed.

  Note: If an attribute is specified in a printer definition, and you later change the value for that attribute in an included component, the value in the printer definition remains unchanged.

- You must create components *before* you create any printer definitions that include these components.

- You must create printer definitions *before* you create any printer pool definitions that list these printer definitions.

- To help you specify a valid **create** statement, first use the ISPF panels to create the Inventory object and then use the PIDU **display** or **export** command to list the attributes for the object.

- If you repeat the same attribute in a **create** statement, the PIDU program uses the last specification.

Examples

You can find additional examples of PIDU commands in file **/usr/lpp/Printsrv/samples/sample.pidl**.

All of these examples also apply to the **force-create** command.

Creating an Allocation Component: This example creates an Allocation component named `printway`. This Allocation component might be included in all printer definitions for printers to be managed by the same IP PrintWay FSA.

```
pidu -c 'create allocation printway
        description="JES allocation values for IP PrintWay"
        output-class=K ; '
```

The attributes set in this component are:

- **description**: This attribute describes the component.

- **output-class**: This attribute specifies the output class that is the JES work-selection criterion for the IP PrintWay FSA; in this example, the output class is K. NetSpool and Print Interface will allocate output data sets on the JES spool in class K.

Creating a Processing Component for PCL Printers: This example creates a Processing component named `pcl_printer` that contains attributes suitable for printers that can print PCL files.

```
pidu -c 'create processing pcl_printer
        description = "Generic PCL options"
        printer-codepage = ISO8859-1
        document-formats-supported = { text pcl modca-p line-data }
        filters = { text -> aopfiltr.so modca-p -> "afp2pcl.dll -c us"
                    line-data -> "afp2pcl.dll -c us" }
        pcl-print-density =  10
        pcl-line-density =  6
        resubmit-for-filtering = yes ; '
```

The attributes set in this component are:

- **description**: This attribute describes the component.
- **printer-codepage**: This attribute specifies ASCII code page ISO8859-1. Specify an ASCII code page so that Print Interface converts EBCDIC data to ASCII before writing data to the JES spool. NetSpool also converts data to this code page when the **netspool-formatting=convert-to-pcl** atttribute is specified in the printer definition.
- **document-formats-supported**: This attribute specifies that the printer accepts text, PCL, MO:DCA-P, and line data. The printer accepts MOD:CA-P and line data because a transform is associated with this data format in the **filters** attribute.
- **filters**: This attribute requests that Print Interface use the following filters:
  - **aopfiltr.so** filter for text data. IBM recommends that you specify this filter for text data. **aopfiltr.so** is provided with Infoprint Server. See "Using the aopfiltr.so Filter" on page 98 for information about this filter.
  - **afp2pcl.dll** filter for MO:DCA-P (AFP) data and line data. This filter transforms AFP and line data to PCL data. See "Transforming AFP Data and Line Data to PCL, PDF, and PostScript Format" on page 205 for information about this filter.
- **resubmit-for-filtering**: This attribute requests that IP PrintWay submit batch output to Print Interface so that AFP data can be transformed to PCL data using the **afp2pcl.dll** filter.
- **pcl-print-density**: This attribute specifies the number of characters per inch to be printed on a line. NetSpool uses this value when the **netspool-formatting=convert-to-pcl** attribute is also specified in the printer definition.
- **pcl-line-density**: This attribute specifies the number of lines per inch to be printed on a page. NetSpool uses this value when the **netspool-formatting=convert-to-pcl** attribute is also specified in the printer definition

Creating a Processing Component for AFP Printers: This example creates a Processing component named `afp_printer` that contains attributes suitable for printing on IBM AFP printers.

```
pidu -c 'create processing afp_printer
        description = "AFP options"
        printer-codepage = IBM-1047
        document-formats-supported = { modca-p line-data text pcl postscript pdf}
```

```
filters = { pcl -> "pcl2afp.dll %filter-options"
                postscript -> "ps2afp.dll %filter-options"
pdf -> "ps2afp.dll %filter-options"} ; '
```

The attributes set in this component are:

- **description**: This attribute describes the component.
- **printer-codepage**: This attribute specifies EBCDIC code page IBM-1047. Specify an EBCDIC code page so that Print Interface converts ASCII data to EBCDIC before writing data to the JES spool.
- **document-formats-supported**: This attribute specifies that the printer accepts MO:DCA-P, line data, text, PCL, PostScript, and PDF data.
- **filters**: This attribute requests that Print Interface use the **pcl2afp.dll** filter, which is provided by Infoprint Server Transforms, to transform PCL data to AFP format (MO:DCA-P) and the **ps2afp.dll** filter to transform both PostScript and PDF data to AFP format. See Chapter 14, "Planning Printer Definitions for Infoprint Server Transforms" on page 201 for information about these filters.

Creating an IP PrintWay Options Component: This example creates an IP PrintWay Options component named `pcl_land_17cpi` that contains attributes suitable for printing in the landscape orientation on PCL printers and for retaining data sets on the JES spool that IP PrintWay cannot transmit to the remote printer.

```
pidu -c 'create printway-options pcl_land_17cpi
        description = "PCL landscape 17 cpi"
        retry-limit = 5
        retry-time  = 5:00
        failure-retention-period = forever
        document-header = "<esc>E<esc>&l1O<esc>(s17H"
        document-trailer = "<esc>E" ; '
```

The attributes set in this component are:

- **description**: This attribute describes the component.
- **retry-limit**: This attribute specifies that IP PrintWay is to retry unsuccessful transmissions up to 5 times before considering the transmission to have failed.
- **retry-time**: This attribute specifies that IP PrintWay is to retry unsuccessful transmissions every 5 minutes. IP PrintWay also automatically retries an unsuccessful transmission right after the first transmission fails.
- **failure-retention-period**: This attribute specifies that IP PrintWay retain the output data set on the JES spool if the transmission fails.
- **document-header**: This attribute specifies printer instructions for printing in the landscape direction. IP PrintWay translates the instructions to ASCII and transmits them to the printer before the data.
- **document-trailer**: This attribute specifies printer instructions to reset the printer to its original state. IP PrintWay translates the instructions to ASCII and transmits them to the printer after the data.

Creating a NetSpool Options Component for PCL Printers: This example creates a NetSpool Options component named `pcl`. The attributes in this component request that NetSpool convert data to PCL before writing it to the JES spool.

```
pidu -c 'create netspool-options pcl
        description = "Convert to PCL"
        netspool-formatting = convert-to-pcl ; '
```

The attributes set in this component are:

- **description**: This attribute describes the component.

- **netspool-formatting**: This attribute requests that NetSpool convert data to PCL before writing it to the JES spool.

Creating a NetSpool Options Component to Print Binary Data: This example creates a NetSpool Options component named `binary`. The attributes in this component request that NetSpool not convert or format data before writing it to the JES spool.

```
pidu -c 'create netspool-options binary
        description = "No formatting; 80 byte records"
        netspool-formatting = none
        maximum-record-size = 80
        recfm = vba ; '
```

The attributes set in this component are:

- **description**: This attribute describes the component.
- **netspool-formatting**: This attribute specifies that NetSpool not format data before writing it to the JES spool.
- **maximum-record-size**: This attribute specifies that NetSpool write a maximum record size of 80 bytes.
- **recfm**: This attribute specifies that NetSpool use a record format of VBA.

Creating a NetSpool End-of-File Component: This example creates a NetSpool End-of-File component named `bracket`. The attributes in this component tell NetSpool to use the end-of-bracket rule to determine when to close the output data set on the JES spool, and also request that NetSpool delete form feed controls that occur at the end of the output data set.

```
pidu -c 'create netspool-eof-rules bracket
        description="Bracket rule; delete trailing form feeds"
        eof-rules={
        default={ all -> {eof-method=end-bracket delete-form-feed=trailing} }
        } ; '
```

The attributes set in this component are:

- **description**: This attribute describes the component.
- **eof-rules**: This attribute specifies the start of the end-of-file rules.
- **default**: This attribute defines default end-of-file rules that apply to all LU types.
- **eof-method**: This attribute requests that NetSpool use the end-of-bracket rule.
- **delete-form-feed**: This attribute requests that NetSpool delete form feed controls at the end of the output data set.

Creating a Protocol Component for LPR Protocol: This example creates a Protocol component named `lpr_options` that contains attributes suitable for transmitting data sets using IP PrintWay and the LPR to LPD protocol.

```
pidu -c 'create protocol lpr_options
        description = "LPR to PASS queue"
        protocol-type = lpr
        print-queue-name = PASS ; '
```

The attributes set in this component are:

- **description**: This attribute describes the component.
- **protocol-type**: This attribute requests the LPR to LPD protocol.
- **print-queue-name**: This attribute specifies the name of the PASS print queue on the target printer.

***Creating an IP PrintWay Printer Definition for a PCL Printer with LPR
Protocol:*** This example creates a printer definition named `lp1` for a printer
managed by IP PrintWay. IP PrintWay uses the LPR to LPD TCP/IP protocol to
transmit data to the remote printer or print server.

```
pidu -c 'create printer lp1
        description = "Default printer - IBM NP17"
        location = "Printer room"
        printer-type = ip-printway
        dcf-routing = yes
        destination = LP1
        printer-ip-address = printer1.boulder
        luname = LUPRT001
        lu-classes = { 2 }
        include-allocation = printway
        include-processing = pcl_printer
        include-printway-options = pcl_land_17cpi
        include-netspool-options = pcl
        include-netspool-eof-rules = bracket
        include-protocol = lpr_options ; '
```

Users can access this printer definition in the following ways:

- Local and remote can users use **lp1** as the name of the destination, print queue,
  or printer definition.
- IPP clients can use one of the following URIs:
  - **ipp://*host*/servlet/IPPServlet/lp1**
  - **http://*host*:631/servlet/IPPServlet/lp1**

  where *host* is the host name or IP address of the z/OS system.
- JCL users can specify either (1) `FSSDATA='printer=lp1'` or (2) `CLASS=K` and
  `DEST=LP1` on an OUTPUT JCL statement. JCL users can also use the AOPPRINT
  procedure, specifying **lp1** as the printer name.
- VTAM applications use NetSpool printer LU name LUPRT001.

The attributes set in this printer definition are:

- **description**: This attribute describes the printer definition.
- **location**: This attribute describes the location of the printer.
- **printer-type**: This attribute specifies that IP PrintWay manages the printer.
- **dcf-routing**: This attribute specifies that users can select this printer using the
  DEST, CLASS and FORMS parameters on an OUTPUT JCL statement. In this
  example, the DEST value is specified in the **destination** attribute, the CLASS
  value is specified in the included Allocation component named `printway`, and the
  FORMS value is not specified.
- **destination**: This attribute specifies that Print Interface and NetSpool allocate
  output data sets on the JES spool with a DEST value of LP1. Because
  dcf-routing=yes, IP PrintWay selects this printer definition when the OUTPUT
  JCL statement contains a DEST value of LP1 and a CLASS value of K.
- **printer-ip-address**: This attribute specifies the IP address of the remote printer
  or print system.
- **luname**: This attribute specifies the NetSpool printer LU name.
- **lu-classes**: This attribute assigns the NetSpool printer LU name to LU class 2.
- **include-*object***: These attributes include components in the printer definition; all
  attributes specified in the named components apply to this printer definition. You
  must create components **printway**, **pcl_printer**, **pcl_land_17cpi**, **pcl**, **bracket**,
  and **lpr_options**.

***Creating an IP PrintWay Printer Definition for a PCL Printer with IPP
Protocol:*** This example creates a printer definition named `lab_printer` for a
remote printer to which IP PrintWay transmits data. IP PrintWay uses Internet
Printing Protocol (IPP) to transmit data to an IPP server running on the remote
printer or print server.

```
pidu -c 'create printer lab_printer
        description = "IPP printer in 004 lab"
        location = "Lab printer room - building 004"
        printer-type = ip-printway
        dcf-routing = yes
        destination = LAB
        luname = LUPRT003
        lu-classes = { 2 }
        protocol-type = ipp
        printer-uri = "ipp://myhost/ippserv/myprintq"
        include-allocation = printway
        include-processing = pcl_printer
        include-printway-options = pcl_land_17cpi
        include-netspool-options = pcl
        include-netspool-eof-rules = bracket ; '
```

Users can access this printer definition in the following ways:

- Local and remote users can use **lab_printer** as the name of the destination, print
  queue, or printer definition.
- IPP clients can use one of the following URIs:
  - **ipp://*host*/servlet/IPPServlet/lab_printer**
  - **http://*host*:631/servlet/IPPServlet/lab_printer**

  where *host* is the host name or IP address of the z/OS system.

- JCL users can specify either (1) `FSSDATA='printer=lab_printer'` or (2) `CLASS=K`
  and `DEST=LAB` on an OUTPUT JCL statement. JCL users can also use the
  AOPPRINT procedure, specifying **lab_printer** as the printer name.
- VTAM applications use NetSpool printer LU name LUPRT003.

The attributes set in this printer definition are:

- **description**: This attribute describes the printer definition.
- **location**: This attribute describes the location of the printer.
- **printer-type**: This attribute specifies that IP PrintWay manages the printer.
- **dcf-routing**: This attribute specifies that users can select this printer using the
  DEST, CLASS, and FORMS parameters on an OUTPUT JCL statement. In this
  example, the DEST value is specified in the **destination** attribute, the CLASS
  value is specified in the Allocation component named `printway`, and the FORMS
  value is not specified.
- **destination**: This attribute specifies that NetSpool and Print Interface allocate
  output data sets on the JES spool with a DEST value of LAB. Because
  dcf-routing=yes, IP PrintWay selects this printer definition when the OUTPUT
  JCL statement contains a DEST value of LAB and a CLASS value of K.
- **luname**: This attribute specifies the NetSpool printer LU name.
- **lu-classes**: This attribute assigns the NetSpool printer LU name to LU class 2.
- **protocol-type**: This attribute requests that IP PrintWay use Internet Printing
  Protocol (IPP) to transmit data to the printer.
- **printer-uri**: This attribute specifies the Uniform Resource Identifier (URI) of the
  remote printer.

- **include-*object***: These attributes include components in the printer definition; all attributes specified in the named components apply to this printer definition. The named components were created in previous examples.

Creating an IP PrintWay Printer Definition for an SCS Printer with VTAM Protocol: This example creates a printer definition named `scs_printer` for a remote printer to which IP PrintWay transmits data. IP PrintWay uses VTAM to transmit data to the SCS printer.

```
pidu -c 'create printer scs_printer
        description = "SCS printer"
        location = "Building 005"
        printer-type = ip-printway
        printer-codepage = IBM-1047
        dcf-routing = yes
        destination = scsprt
        protocol-type = vtam
        printer-luname = p001
        printer-logmode = scs
        vtam-checkpoint-pages = 10
        printway-formatting = use-fcb
        scs-top-margin = 6
        scs-bottom-margin = 62
        scs-left-margin = 11
        scs-right-margin = 71
        scs-maximum-line-length = 80
        scs-maximum-page-length = 66
        include-allocation = printway ; '
```

Users can access this printer definition in the following ways:

- Local and remote users can use **scs_printer** as the name of the destination, print queue, or printer definition.
- IPP clients can use one of the following URIs:
  - **ipp://*host*/servlet/IPPServlet/scs_printer**
  - **http://*host*:631/servlet/IPPServlet/scs_printer**

  where *host* is the host name or IP address of the z/OS system on which Infoprint Server is running.
- JCL users can specify either (1) `FSSDATA='printer=scs_printer'` or (2) `CLASS=K` and `DEST=SCSPRT` on an OUTPUT JCL statement. JCL users can also use the AOPPRINT procedure, specifying **scs_printer** as the printer name.

The attributes set in this printer definition are:

- **description**: This attribute describes the printer definition.
- **location**: This attribute describes the location of the printer.
- **printer-codepage**: This attribute specifies EBCDIC code page IBM-1047. Specify an EBCDIC code page so that Print Interface and IP PrintWay convert ASCII data to EBCDIC. Most SCS printers accept EBCDIC data.
- **printer-type**: This attribute specifies that IP PrintWay manages the printer.
- **dcf-routing**: This attribute specifies that users can use the DEST, CLASS, and FORMS parameters on an OUTPUT JCL statement to select this printer definition. In this example, the DEST value is specified in the **destination** attribute, the CLASS value is specified in the Allocation component named `printway`, and the FORMS value is not specified.
- **destination**: This attribute specifies that Print Interface allocate output data sets on the JES spool with a DEST value of SCSPRT. Because the **dcf-routing=yes** attribute is specified, IP PrintWay uses this printer definition for all data sets on the JES spool with a DEST value of SCSPRT and a CLASS value of K.

- **protocol-type**: This attribute requests that IP PrintWay use VTAM to transmit data to the printer.
- **printer-luname**: This attribute specifies the name of the remote SCS printer as defined to VTAM.
- **vtam-checkpoint-pages**: This attribute specifies that IP PrintWay will request a definitive response from the printer every 10 pages.
- **printway-formatting**: This attribute specifies that the FCB, if specified, is used to create the SCS data stream.
- **scs-*xxxx***: These attributes specify formatting values.
- **include-allocation:** This attribute includes the previously defined allocation component named `printway`. See "Creating an Allocation Component" on page 241.

Creating an IP PrintWay Printer Definition for the E-mail Protocol: This example creates a printer definition named `deptmail` and selects the e-mail protocol.

```
pidu -c 'create printer deptmail
        description = "E-mail destination"
        location = "Departments 01 and 02"
        printer-type = ip-printway
        printer-codepage = IBM-1047
        dcf-routing = yes
        destination = DEPTMAIL
        protocol-type = email
        title-text = "My default e-mail title"
        email-to-address = "myname@xyz.com,dept01mail,dept02mail"
        luname = DEPTMAIL
        lu-classes={ 1 }
        printway-formatting = use-fcb
        print-page-header = no
        dataset-grouping = concatenate-job
        include-allocation = printway ; '
```

Users can access this printer definition in the following ways:

- Local and remote users can use `deptmail` as the name of the destination, print queue, or printer definition.
- IPP clients can use one of the following URIs:
  - `ipp://host/servlet/IPPServlet/deptmail`
  - `http://host:631/servlet/IPPServlet/deptmail`

  where *host* is the host name or IP address of the z/OS system.
- JCL users can specify either (1) `FSSDATA='printer=deptmail'` or (2) `CLASS=K` and `DEST=DEPTMAIL` on an OUTPUT JCL statement. Users of the AOPPRINT procedure specify `deptmail` as the printer name.

The attributes set in this printer definition are:

- **description**: This attribute describes the printer definition.
- **location**: This attribute describes the e-mail destination.
- **printer-type**: This attribute specifies IP PrintWay.
- **printer-codepage**: This attribute specifies EBCDIC code page IBM-1047. Specify an EBCDIC code page so that Print Interface and IP PrintWay convert ASCII text data to EBCDIC.
- **dcf-routing**: This attribute specifies that job submitters can use the DEST, CLASS, and FORMS parameters on an OUTPUT JCL statement to select this printer definition. In this example, the DEST value is specified in the **destination**

attribute, the CLASS value is specified in the Allocation component named `printway`, and the FORMS value is not specified.

- **destination**: This attribute specifies that Print Interface and NetSpool allocate output data sets on the JES spool with a DEST value of DEPTMAIL. Because the **dcf-routing=yes** attribute is specified, IP PrintWay uses this printer definition for all data sets on the JES spool with a DEST value of DEPTMAIL and a CLASS value of K.
- **protocol-type**: This attribute requests that IP PrintWay use the e-mail protocol.
- **title-text**: This attribute specifies a default subject for e-mails.
- **email-to-address**: This attribute specifies the e-mail addresses of the primary recipients. One e-mail address and two z/OS UNIX sendmail alias names are specified.
- **luname**: This attribute specifies the NetSpool printer LU name.
- **lu-classes**: This attribute assigns the NetSpool printer LU name to LU class 1.
- **printway-formatting**: This attribute specifies IP PrintWay use the FCB, if one is specified, to format line data.
- **print-page-header**: This attribute causes IP PrintWay not to add a page header when it formats line data.
- **dataset-grouping**: This attribute requests that data sets that are in the same JES output subgroup be sent as attachments in the same e-mail.
- **include-allocation:** This attribute includes the previously defined Allocation component named `printway`. See "Creating an Allocation Component" on page 241 .

Creating a PSF for OS/390 Printer Definition: This example creates a printer definition named `prt2` for an IBM AFP printer controlled by PSF for OS/390.

```
pidu -c 'create printer prt2
        description = "Dept 002 printer - IBM 3900"
        location = "Building 002 printer room"
        printer-type = psf-mvs
        destination = DEPT002
        output-class = J
        luname = LUPRT002
        lu-classes = { 2 }
        include-processing = afp_printer
        include-netspool-eof-rules = bracket ; '
```

Users can access this printer definition in the following ways:

- Local and remote users can use **prt2** as the name of the destination, print queue, or printer definition.
- IPP clients can use one of the following URIs:
  - **ipp://*host*/servlet/IPPServlet/prt2**
  - **http://*host*:631/servlet/IPPServlet/prt2**

  where *host* is the host name or IP address of the z/OS system.
- JCL users can use the AOPPRINT procedure to access this printer definition, specifying **prt2** as the printer name. Refer to *z/OS Infoprint Server User's Guide* for information about the AOPPRINT procedure.
- VTAM applications can use NetSpool printer LU name LUPRT002.

The attributes set in this printer definition are:

- **description**: This attribute describes the printer definition.
- **location**: This attribute describes the location of the printer.
- **printer-type**: This attribute specifies that PSF for OS/390 manages the printer.

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- **output-class**: This attribute specifies the output class that is the JES work-selection criterion for the PSF for OS/390 printer FSA; in this example, the output class is J. NetSpool and Print Interface will allocate output data sets on the JES spool in class J.
- **luname**: This attribute specifies the NetSpool printer LU name.
- **lu-classes**: This attribute assigns the NetSpool printer LU name to LU class 2.
- **include-*object***: These attributes include components in the printer definition; all attributes specified in the named components apply to this printer definition. The named components were created in previous examples.

Creating a General Printer Definition: This example creates a printer definition named fred for a printer that is not controlled by IP PrintWay or by PSF for OS/390.

```
pidu -c 'create printer fred
        description = "Fred Jones"
        location = "Office A-11"
        printer-type = general
        general-spooling-mode = line
        destination = FRED ;'
```

Users can access this printer definition in the following ways:
- Local and remote users use **fred** as the name of the destination, print queue, or printer definition.
- IPP clients use one of the following URIs:
    - **ipp://*host*/servlet/IPPServlet/fred**
    - **http://*host*:631/servlet/IPPServlet/fred**

    where *host* is the host name or IP address of the OS/390 system.
- JCL users can use the AOPPRINT procedure to access this printer definition, specifying **fred** as the printer name. Refer to *z/OS Infoprint Server User's Guide* for information about the AOPPRINT procedure.

    Note: This example does not specify the **luname** attribute; therefore, VTAM applications cannot print to this printer definition.

The attributes set in this printer definition are:
- **description**: This attribute describes the printer definition.
- **location**: This attribute describes the location of the printer.
- **printer-type**: This attribute specifies General.
- **general-spooling-mode**: This attribute tells Print Interface to write data to the output data set on the JES spool in record format.
- **destination**: This attribute specifies the destination name that is the JES work-selection criterion for the printer. NetSpool and Print Interface allocate output data sets on the JES spool with destination name FRED.

Creating a Printer Pool Definition: This example creates a printer pool definition named DEPT004. NetSpool creates a separate output data set on the JES spool for each printer definition in the printer pool definition.

To print to printer definitions p1, p2, and p3, VTAM applications use NetSpool printer LU name LU4.

```
pidu -c 'create printer-pool DEPT004
        description = "All printers in dept 004"
        luname = LU4
        lu-classes = { 1 2 }
        include-netspool-eof-rules = bracket
        printer-names = { p1 p2 p3 } ; '
```

The attributes set in this printer definition are:

- **description**: This attribute describes the printer definition.
- **luname**: This attribute specifies the NetSpool printer LU name `LU4`.
- **lu-classes**: This attribute assigns the NetSpool printer LU to LU classes 1 and 2.
- **include-netspool-eof-rules**: This attribute includes the NetSpool End-of-File Rules component named `bracket`. You must also create this component.
- **printer-names**: This attribute lists the names of the printer definitions in the pool. You must create printer definitions named `p1`, `p2`, and `p3`.

Creating an IP PrintWay FSS Definition: This example creates an FSS definition for an IP PrintWay functional subsystem (FSS) named `PRINTWAY`. The name of this definition (PRINTWAY) must match the name used to define the FSS to JES. An IP PrintWay FSS definition is optional; create one only if you want to change the default values that IP PrintWay uses.

```
pidu -c 'create printway-fss PRINTWAY
        trace-mode = internal ; '
```

The **trace-mode** attributes turns internal tracing on for the IP PrintWay FSS and all functional subsystem applications (FSAs) within this FSS.

Creating an IP PrintWay FSA Definition: This example creates an FSA definition for an IP PrintWay functional subsystem application (FSA) named `PRT123`. The name of the FSA definition (PRT123) must match the name used to define the FSA to JES. An IP PrintWay FSA definition is optional; create one only if you want to change default values that IP PrintWay uses.

```
pidu -c 'create fsa PRT123
        fsa-type = ip-printway
        trace-mode = full ; '
```

The attributes set in this printer definition are:

- **fsa-type**: This attribute tells the ISPF panels to display this definition as an IP PrintWay FSA definition.
- **trace-mode**: This attribute requests a full trace for this FSA.

Creating a PSF for OS/390 FSS Definition: This example creates an FSS definition for a PSF functional subsystem (FSS) named `PSFFSS`. Your system programmer must also define an FSS named PSFFSS to JES.

```
pidu -c 'create psf-fss PSFFSS
        tcpip-job-name          = TCPIP ; '
```

Creating a PSF for OS/390 FSA Definition: This example creates an FSA definition for a PSF functional subsystem application (FSA) named `PRT3`. Your system programmer must also define an FSA named PRT3 to JES.

```
pidu -c 'create fsa PRT3
        fsa-type = psf-tcpip
        form-definition = A10110
        page-definition = A08682
        printer-ip-address = 9.99.12.33 ; '
```

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The attributes set in this printer definition are:
- **fsa-type**: This attribute tells the ISPF panels to display this definition as a PSF for OS/390 FSA definition for a TCP/IP-connected printer.
- **form-definition**: This attribute names the default form definition for the printer.
- **page-definition**: This attribute names the default page definition for the printer.
- **printer-ip-address**: This attribute identifies the IP address of the target printer.

delete—Delete an Object in the Printer Inventory

Format
delete *objectclass name* **;**

Description
The **delete** command deletes a printer definition, component, printer-pool definition, FSS definition, or FSA definition in the Printer Inventory.

Operands

objectclass   The class of the object that you want to delete. Valid values are: **allocation, fsa, netspool-eof-rules, netspool-options, printway-fss, psf-fss, printer, printer-pool, printway-options, processing**, and **protocol**. See Table 23 on page 238 for a description of these object classes.

name   The name of the object. Names are case sensitive, so be sure to use the correct uppercase and lowercase letters. Enclose the name in single or double quotation marks if the name contains special characters.

Usage Notes
- You cannot delete a component that is included in one or more printer definitions. You must first modify the printer definitions to remove the component names. You can use the PIDU **list** command to list all printer definitions that include a component and the PIDU **modify** command to modify the printer definitions.
- If you delete a printer definition that is listed in a printer pool definition, that printer definition is removed from the list of printers in the printer pool definition.

Examples

Deleting a Component: This example deletes the NetSpool Options component named `binary`. This example also shows the **list** command that you should use before you delete the component to make sure that no printer definitions include that component.
```
pidu -c 'list printer where include-netspool-options=binary ; '
pidu -c 'delete netspool-options binary ; '
```

Deleting an FSA Definition: This example deletes the FSA definition named `FSA1`.
```
pidu -c 'delete fsa FSA1 ; '
```

display—Show Attributes of an Object in the Printer Inventory

Format
display *objectclass name* **;**

Description

The **display** command lists the attributes for one printer definition, component, printer-pool definition, FSS definition, or FSA definition in the Printer Inventory. This command writes the attributes to **stdout**. The attributes are displayed in the format required by the **create** command.

Operands

objectclass   The class of the object that you want to display. Valid values are: **allocation, fsa, netspool-eof-rules, netspool-options, printway-fss, psf-fss, printer, printer-pool, printway-options, processing**, and **protocol**. See Table 23 on page 238 for a description of these object classes.

name   The name of the object. Names are case sensitive, so be sure to use the correct uppercase and lowercase letters. Enclose the name in single or double quotation marks if the name contains special characters.

Usage Notes

• The **display** command does *not* list attributes that are specified in any components that are included in a printer definition. Therefore, if a printer definition includes components, you must use the **display** command to individually list the components if you want to see all attributes that apply to the printer definition. If the same attribute is defined in a printer definition and a component, the value in the printer definition overrides the value in the component.

• The **display** command might *not* list attributes that you have set to default values. This is because the Infoprint Server ISPF panels do not generally store attributes with default values, in order to save space in the Printer Inventory.

Examples

Displaying All Attributes for a Printer Definition: This example displays all attributes for the **lp1** printer definition. It also displays all attributes for the components that are included in the **lp1** printer definition. (See "Creating an IP PrintWay Printer Definition for a PCL Printer with LPR Protocol" on page 245 for the **create** statement for printer definition **lp1**.)

```
pidu -c 'display printer lp1 ; '
pidu -c 'display allocation printway ;
        display processing pcl_printer ;
        display printway-options pcl_land_17cpi ;
        display protocol lpr_options ;
        display netspool-options pcl;
        display netspool-eof-rules bracket ; '
```

Displaying an FSA Definition: This example displays all attributes for the **FSA1** FSA definition.

```
pidu -c 'display fsa FSA1 ; '
```

dump—Dump the Printer Inventory to a File

Format

dump *filename* ;

dump

Description

The **dump** command writes the contents of the Printer Inventory to the named file. Your IBM service representative might ask you to use the **dump** command to assist IBM in diagnosing problems in the Printer Inventory.

Operands

filename   The name of the output file, which can be a UNIX file or an MVS data set. The output file does not need to exist; however, if the file already exists, the contents are overwritten.

If the data set is an MVS data set, specify **//** before the filename. If you specify a fully qualified data set name, also enclose the data set name in single quotes and code a backslash before each single quote. For example, if the output file is named `USERID.MYFILE`, enter:

`//\'USERID.MYFILE\'`

If you want your TSO user ID prefixed to the data set name, specify:

`//MYFILE`

Usage Notes

- If you allocate an MVS data set for the output file, IBM recommends that you use RECFM=VB and LRECL=8192; however, other values might be suitable as well.
- To write the contents of the Printer Inventory to a file in a more readable format, or to backup the Printer Inventory, use the **export** command.

Examples

This example writes the contents of the Printer Inventory to file named `inventory.dump`.

`pidu -c 'dump inventory.dump ; '`

This example writes the contents of the Printer Inventory to an MVS data set named `USER1.INVENT.DUMP`.

`pidu -c "dump //\'USER1.INVENT.DUMP\' ; "`

export—Export Objects in the Printer Inventory to a File

Format

export *filename* **[***objectclass* **[where** *condition* **[and|or** *condition***]...]];**

Description

The **export** command exports all objects in the Printer Inventory or only those objects that meet specified conditions. You can use the **export** command to backup the Printer Inventory. Also, the statements in the output file can be used as input to the PIDU program on another z/OS system.

The **export** command writes a **create** statement for each exported object to an output file. The output file does not need to exist; however, if the file already exists, the file is replaced.

Note: IBM recommends that you use the **export** command to backup the Printer Inventory. Do *not* use ordinary copy commands to create a backup copy of the Printer Inventory because the copy might contain inconsistent data. For

more information about how to schedule regular backups of the Printer Inventory and how to restore the Printer Inventory, refer to *z/OS Infoprint Server Customization*.

Operands

filename   The name of the output file, which can be a UNIX file or an MVS data set.

If the data set is an MVS data set, specify **//** before the filename. If you specify a fully qualified data set name, also enclose the data set name in single quotes and code a backslash before each single quote. For example, if the output data set is named `USERID.MYFILE`, enter:

```
//\'USERID.MYFILE\'
```

If you want your TSO user ID prefixed to the data set name, specify:

```
//MYFILE
```

objectclass   The class of the objects that you want to export. Valid values are: **allocation, fsa, netspool-eof-rules, netspool-options, printway-fss, psf-fss, printer, printer-pool, printway-options, processing**, and **protocol**. See Table 23 on page 238 for a description of these object classes. If you omit this operand, all objects are exported.

where *condition* **[and|or** *condition*]**...**

One or more conditions, which can limit the objects that are exported; only objects that are in the specified object class and that meet the conditions are exported. If you omit the **where** predicate, all objects in the specified object class are exported.

See "Where Predicate" on page 239 for information about how to specify conditions.

Usage Notes

- If you allocate an MVS data set for the output file, IBM recommends that you use RECFM=VB and LRECL=8192; however, other values might be suitable as well.
- The **export** command might *not* export attributes that you have set to default values. This is because the Infoprint Server ISPF panels do not generally store attributes with default values, in order to save space in the Printer Inventory.

Examples

Exporting All Objects in the Printer Inventory:

- This example exports all objects in the Printer Inventory to UNIX file **inventory.export**.

```
pidu -c 'export inventory.export ; '
```

- This example exports all objects in the Printer Inventory to MVS data set **USER1.INVENT.EXPORT**.

```
pidu -c "export //\'USER1.INVENT.EXPORT\' ; "
```

Exporting All or Selected Printer Definitions:

- This example exports all printer definitions in the Printer Inventory to UNIX file **printers.export**.

```
pidu -c 'export printers.export printer ; '
```

- This example exports all printer definitions that contain attribute **output-class = K**, either in the printer definition or in an included component, to file **classk.export**.

```
pidu -c 'export classk.export printer where output-class=K ; '
```

Exporting Selected FSA Definitions: This example exports selected FSA definitions in the Printer Inventory to UNIX file **psffsa.export**. The **where** predicate specifies that only FSA definitions used by PSF be exported.

```
pidu -c 'export psffsa.export fsa
         where fsa-type=psf-tcpip or fsa-type=psf-channel or fsa-type=psf-sna ; '
```

list—List Names of Objects in the Printer Inventory

Format
list *objectclass* **[where** *condition* **[and|or** *condition***]...] ;**

Description
The **list** command lists the names of all objects in a specified object class or only objects that meet certain criteria.

Operands

objectclass   The class of the objects that you want to list. Valid values are: **allocation, fsa, netspool-eof-rules, netspool-options, printway-fss, psf-fss, printer, printer-pool, printway-options, processing**, and **protocol**. See Table 23 on page 238 for a description of these object classes.

where *condition* **[and|or** *condition***...]**
Conditions that can limit the objects that are listed; only objects that meet the conditions are listed. If you omit the **where** predicate, all objects in the specified object class are listed.

See "Where Predicate" on page 239 for information about how to specify a condition.

Usage Notes
You can use the **list** command in combination with the **modify** command to list all or selected objects in an object class and then modify one or more attributes. See "Listing and Modifying Printer Definitions" on page 259 for an example.

Examples

Listing Printer Definitions:

- This example lists all IP PrintWay printer definitions.

```
pidu -c 'list printer where printer-type=ip-printway ; '
```
- This example lists all PSF for OS/390 printer definitions.

```
pidu -c 'list printer where printer-type=psf-mvs ; '
```
- This example lists printer definitions that include the Protocol component named `lpr_options`.

```
pidu -c 'list printer where include-protocol=lpr_options ; '
```
- This example lists printer definitions that specify an LU name in the **luname** attribute; that is, the value of the **luname** attribute is not a null value.

```
pidu -c 'list printer where not luname=null ; '
```
- This example lists IP PrintWay printer definitions that do not include a Protocol component; that is, the value of the **include-protocol** attribute is a null value.

```
pidu -c 'list printer where printer-type=ip-printway and include-protocol=null;'
```
- This example lists printer definitions whose names start with **prt**.

```
pidu -c 'list printer where name match "∧prt" ; '
```
- This example lists printer definitions that contain attribute **output-class=K**, either in the printer definition or in an included component.

```
pidu -c 'list printer where output-class=K ; '
```
- This example lists printer definitions that have a printer type of **ip-printway** and also have either output class X or Y. The parentheses cause the **or** expression to be evaluated first.

```
pidu -c 'list printer where printer-type=ip-printway and
         (output-class = X or output-class = Y) ; '
```

Listing Printer Pool Definitions: This example lists all printer pool definitions in the Printer Inventory.

```
pidu -c 'list printer-pool ; '
```

Listing Components: This example lists all components in the Printer Inventory.

```
pidu -c 'list allocation ; list netspool-eof-rules ; list netspool-options ; '
pidu -c 'list printway-options ; list processing ; list protocol ; '
```

Listing FSS Definitions:
- This example lists all IP PrintWay FSS definitions.

```
pidu -c 'list printway-fss ; '
```
- This example lists all PSF for OS/390 FSS definitions.

```
pidu -c 'list psf-fss ; '
```

Listing FSA Definitions:
- This example lists all FSA definitions in the Printer Inventory.

```
pidu -c 'list fsa ; '
```
- This example lists all IP PrintWay FSA definitions.

```
pidu -c 'list fsa where fsa-type=ip-printway ; '
```
- This example lists all PSF for OS/390 FSA definitions.

```
pidu -c 'list fsa where fsa-type=psf-channel or fsa-type=psf-sna or
fsa-type=psf-tcpip ; '
```

modify—Change Attributes of an Object in the Printer Inventory

Format
modify *objectclass* *name* **[***attribute* = *value***]... ;**

Description
The **modify** command modifies attributes for a printer definition, component, printer-pool definition, FSS definition, or FSA definition in the Printer Inventory. The Inventory object must already exist in the Printer Inventory.

Changes you make to attributes for a printer definition or component generally take effect for the next data set that NetSpool and Print Interface allocate on the JES spool and the next data set that IP PrintWay selects from the JES spool. Changes to NetSpool end-of-file rules or to the NetSpool LU class (attribute **lu-classes**), however, are related to the VTAM session and do not take effect for the next data set allocated on the JES spool; see "Specifying How NetSpool Determines End-of-File" on page 139 and "Grouping NetSpool Printer LUs into LU Classes" on page 122 for information about when changes to these fields take effect.

modify

Changes you make to a printer definition or component do *not* affect data sets that IP PrintWay has retained on the JES spool after successful or failed transmission.

Changes you make to attributes for an FSA definition take effect only when you restart the IP PrintWay or PSF for OS/390 FSA; changes you make to attributes for an FSS definition take effect when you restart the FSS.

Operands

objectclass   The class of the object that you want to modify. Valid values are: **allocation, fsa, netspool-eof-rules, netspool-options, printway-fss, psf-fss, printer, printer-pool, printway-options, processing**, and **protocol**. See Table 23 on page 238 for a description of these object classes.

name   The name of the object. Names are case sensitive, so be sure to use the correct uppercase and lowercase letters. Enclose the name in single or double quotation marks if the name contains special characters.

attribute = value

One or more attributes and values. Separate attributes with spaces. See "Attribute Listing" on page 262 for the valid attributes for each object class.

Usage Notes

- To remove an attribute, type **null** as the value for the attribute. See "Default Values" on page 260 for a description of the **null** value.
- If you modify an attribute in a component, the modified attribute applies to all printer definitions that include the component unless the attribute is also specified for the printer definition itself. In this case, the printer definition retains its attribute value.
- If you repeat the same attribute in a **modify** statement, the PIDU program uses the last specification.
- You can use the **list** command in combination with the **modify** command to modify all or selected objects in an object class. See "Listing and Modifying Printer Definitions" on page 259 for an example.

Examples

Modifying an Allocation Component: This example modifies the Allocation component named `printway`. The modified attribute (**output-class)** applies to all printer definitions that include this component unless the **output-class** attribute is specified for the printer definition itself.

```
pidu -c 'modify allocation printway output-class=L ; '
```

Modifying a Printer Definition: This example changes the protocol used by IP PrintWay in the printer definition named `lab_printer`. (See"Creating an IP PrintWay Printer Definition for a PCL Printer with IPP Protocol" on page 246 for the **create** statement for this printer definition.)

```
pidu -c 'modify printer lab_printer
        protocol-type             = lpr
        printer-uri               = null
        printer-ip-address        = printer2.boulder
        print-queue-name          = TEXT ; '
```

The attributes modified in this printer definition are:

- **protocol-type**: The new protocol is the LPR protocol.
- **printer-uri**: This attribute is removed because the URI is not used for the LPR protocol.
- **printer-ip-address**: This attribute specifies the host name of the remote printer. It is required for the LPR protocol.
- **print-queue-name**: This attribute specifies the print queue name on the remote printer. It is required for the LPR protocol.

Listing and Modifying Printer Definitions: This example, entered as one command on the z/OS UNIX command line, lists selected printer definitions and changes an attribute in those printer definitions. This example uses the following PIDU commands and the **awk** command:

1. The PIDU **list** command lists the names of all printer definitions with **output-class=K**.
2. These names are input to the **awk** program, which writes PIDU **modify** commands to modify the **output-class** attribute. For information about the **awk** program, refer to *z/OS UNIX System Services Command Reference*.
3. The output from the **awk** program is input to the **pidu** command.

```
pidu -qc "list printer where output-class = K ; " |
    awk '{ print "modify printer " $1 " output-class = \"B\";" }' |
    pidu
```

rename—Rename an Object in the Printer Inventory

Format
rename *objectclass name newname* **;**

Description
The **rename** command renames a printer definition, component, printer-pool definition, FSS definition, or FSA definition in the Printer Inventory.

If you rename a component, this command automatically renames the component in all printer definitions that include the component. If you rename a printer definition, this command automatically renames the printer definitions in all printer pool definitions that list the printer definition.

Operands

objectclass   The class of the object that you want to rename. Valid values are: **allocation, fsa, netspool-eof-rules, netspool-options, printway-fss, psf-fss, printer, printer-pool, printway-options, processing**, and **protocol**. See Table 23 on page 238 for a description of these object classes.

name   The name of the object. Names are case sensitive, so be sure to use the correct uppercase and lowercase letters. Enclose the name in single or double quotation marks if the name contains special characters.

newname   The new name to identify the object. This name must be a unique name for the class of object in the Printer Inventory.

When you create a printer definition, printer-pool definition, or component, specify any combination of 1-17 letters (a-z, A-Z), numbers (0-9), and special characters (such as $ # @ . - = /). Blank characters are not allowed. In an IP PrintWay printer definition, use

name DFLTNTRY to designate the IP PrintWay default printer definition. The name is case sensitive.

When you create an FSS or FSA definition, this name must match the name used to define the FSA or FSS to JES. Specify a valid combination of 1-8 letters, numbers, and special characters (# $ @). The first character cannot be numeric. Lowercase letters are converted to uppercase.

If the name contains special characters, enclose the name in single or double quotation marks.

Example

This example renames the printer definition named `lab_printer` to new name `jim`.

```
pidu -c 'rename printer lab_printer jim ; '
```

Attribute Characteristics

This section describes the following characteristics of the attributes that you can specify in PIDU commands:
- Valid abbreviations for attribute names and values
- Default values for attributes
- Single-valued and multi-valued attributes
- Types of values: integers, strings, and fixed values

Abbreviations

The attributes listed in this section show attribute names and values in their complete form. Often, you can abbreviate attribute names and values by using the first letter of each word in the name or value. For example, you can use the abbreviation **d-f-s** for the **document-formats-supported** attribute. You can use **po** for the **postscript** value, and specify the attribute and value pair as **d-f-s={po**}.

Sometimes specifying only the first letter in each word is ambiguous. For example, **c** might stand for **class** or **copies**. Here, specify enough of the name so that it is unique, as in **cl** or **co**. If the values are ambiguous, the PIDU program rejects the command with an error message.

Default Values

When you create an object and omit an attribute, no value is assigned to that attribute in the Printer Inventory. For attributes that have no value, Infoprint Server takes a default action, which is described in the heading "Default Value".

If you do specify a value for an attribute and later want to remove the attribute so that Infoprint Server performs the default action, use the **modify** command and specify **null** as the attribute value.

For example, to remove the value for the **notify** attribute, you could specify:

```
notify = null
```

Single-Valued and Multi-Valued Attributes

Specify attributes in the following format, with or without spaces on either side of the equal sign:

attribute=value or *attribute = value*

Attributes can be either *single-valued* or *multi-valued*.

Single-Valued Attributes: Single-valued attributes accept only one value. For single-valued attributes, the syntax is:

attribute = value
attribute="value with spaces"

Multi-Valued Attributes: Multi-valued attributes accept one or more values separated with spaces and enclosed in braces. Multi-valued attributes can contain a *list* of values or a *value-map*.

- A **list** assigns one or more values to the attribute. The syntax is:

  *attribute=***{***value1 value2 value3***}**

  For example: `printer-names={printer1 printer2 printer3}`

- A **value-map** assigns one value to another. The syntax is:

  *attribute = ***{***value1 **->** value2 value3 **->** value4***}**

  For example: `filters={pcl -> pcl2afp.dll pdf -> pdf2afp.dll}`

Types of Values

You can specify the following types of values:
- Integer values
- String values
- Fixed values, also knows as enumerated values

Integer Values

Some attributes accept integer values. You can specify integer values in either decimal or hexadecimal format. Begin a hexadecimal value with 0 (zero) followed by letter x. After the 0x, type any number (0-9) or a letter (A-F or a-f). Lowercase letters are equivalent to uppercase letters. The **display** command always displays the decimal equivalent of hexadecimal values.

For example, the following integer values are equivalent:

```
dump-code = 0x09600c00
dump-code = 157289480
```

String Values

Some attributes accept a string of printable characters. Enclose a string value in double or single quotes if it includes blanks or special characters (such as #, (,), or $), for example:

```
description = "My printer"
```

Most string values are stored in the Printer Inventory with the same uppercase and lowercase letters that you type when you specify the value; however, in some cases, lowercase letters are converted to uppercase letters. For example, the value you enter for the **output-class** attribute is converted to uppercase because JES accepts only uppercase letters for the JES output class.

Fixed Values (Enumerated Values)

Some attributes accept one or more keywords as values; these keywords are called *fixed values* in this publication. The **pidu** command calls these values *enumerated values*. Fixed values are case sensitive; always use lowercase characters when typing fixed values. For example, you can specify the following fixed values for the **printer-type** attribute:

```
printer-type=ip-printway
printer-type=psf-mvs
printer-type=general
```

Attribute Listing

This section describes the attributes that you can use when you create or modify objects in the Printer Inventory. The attributes for each object class are listed alphabetically within the section for that object class. Table 25 summarizes the object classes and where you can find the list of valid attributes for that object class.

Table 25. Object Classes

Object Class	See Page:
allocation	271
fsa	292
netspool-eof-rules	308
netspool-options	308
printer	310
printer-pool	315
printway-fss	317
printway-options	321
processing	331
protocol	345
psf-fss	355

Table 26 lists the attributes in alphabetical order. It shows what object classes each attribute applies to and where to find information about the attribute.

Table 26. Attributes and Valid Object Classes

Attribute	Object Class	See Page:
acknowledgement-level	**fsa**	292
address-text	**allocation**	271
	printer	271
applid	**fsa**	292
	printway-fss	317
begin-dataset-exit	**printer**	321
	printway-options	321
blank-compression	**fsa**	293
building-text	**allocation**	271
	printer	271
burster-trimmer-stacker	**allocation**	272
	printer	272
capture-inline-resources	**fsa**	293
carriage-control-type	**printer**	321
	printway-options	321
channel-buffer-count	**fsa**	293

Table 26. Attributes and Valid Object Classes (continued)

Attribute	Object Class	See Page:
chars	**allocation**	272
	fsa	293
	printer	272
checkpoint-pages	**allocation**	273
	printer	273
checkpoint-seconds	**allocation**	273
	printer	273
close-libraries-when-idle	**fsa**	293
color-map	**allocation**	274
	fsa	294
	printer	274
com-setup-member	**allocation**	274
	fsa	294
	printer	274
connection-timeout	**printer**	322
	printway-options	322
consolidate-im1-images	**fsa**	294
copies	**allocation**	274
	printer	274
copy-group	**allocation**	275
	printer	275
cse-check-fit	**fsa**	294
cse-orientation	**fsa**	294
cse-sheet-eject	**fsa**	294
dataset-grouping	**printer**	322
	printway-options	322
db-translate-table	**printer**	331
	processing	331
dcf-routing	**printer**	311
default-document-codepage	**printway-fss**	318
default-process-mode	**fsa**	295
delete-form-feed	**printer**	323
	printway-options	323
department-text	**allocation**	275
	printer	275
description	**allocation**	276
	fsa	295
	netspool-eof-rules	308
	netspool-options	308
	printer	311
	printer-pool	315
	printway-fss	318
	printway-options	323
	processing	332
	protocol	346
	psf-fss	355
destination	**allocation**	276
	printer	276

Table 26. Attributes and Valid Object Classes (continued)

Attribute	Object Class	See Page:
disconnect-action	**fsa**	295
document-codepage	**printer**	332
	processing	332
document-formats-supported	**printer**	332
	processing	332
document-header	**printer**	324
	printway-options	324
document-trailer	**printer**	324
	printway-options	324
dump-code	**fsa**	295
dump-message-id	**fsa**	296
duplex	**allocation**	276
	printer	276
duplexes-supported	**printer**	333
	processing	333
eject-to-front-facing	**fsa**	296
email-to-address	**printer**	346
	protocol	346
end-dataset-exit	**printer**	325
	printway-options	325
end-sna-conversation	**fsa**	296
error-disposition	**allocation**	277
	printer	277
error-disposition-supported	**fsa**	296
failure-action	**fsa**	296
failure-retention-period	**printer**	325
	printway-options	325
filters	**printer**	333
	processing	333
flash-count	**allocation**	277
	printer	277
flash-name	**allocation**	277
	printer	277
form-definition	**allocation**	278
	fsa	297
	printer	278
forms	**allocation**	278
	printer	278
forms-control-buffer	**allocation**	278
	printer	278
forms-supported	**printer**	334
	processing	334
fsa-trace-dsname	**fsa**	297
fsa-type	**fsa**	297
general-spooling-mode	**printer**	312

Table 26. Attributes and Valid Object Classes (continued)

Attribute	Object Class	See Page:
global-overlay	**fsa**	297
group-identifier	**allocation**	279
	printer	279
hold	**allocation**	279
	printer	279
include-allocation	**printer**	312
include-netspool-eof-rules	**printer**	312
	printer-pool	316
include-netspool-options	**printer**	313
include-printway-options	**printer**	313
include-processing	**printer**	313
include-protocol	**printer**	313
inhibit-recovery	**fsa**	297
input-tray-map	**printer**	334
	processing	334
input-tray-number	**allocation**	279
	printer	279
interrupt-message-page	**fsa**	297
interrupt-message-page-copies	**fsa**	298
issue-setup-messages	**fsa**	298
jes-form-length	**allocation**	280
	printer	280
jes-maximum-line-count	**allocation**	280
	printer	280
jes-node	**allocation**	280
	printer	280
jes-priority	**allocation**	281
	printer	281
jes-threshold	**allocation**	281
	printer	281
jes-writer	**allocation**	281
	printer	281
label-data-pages	**allocation**	281
	fsa	298
	printer	281
label-separator-pages	**fsa**	298
line-termination	**printer**	325
	printway-options	325
location	**printer**	314
logmode	**fsa**	298
lpr-banner-class	**printer**	347
	protocol	347
lpr-banner-job-name	**printer**	347
	protocol	347

Table 26. Attributes and Valid Object Classes (continued)

Attribute	Object Class	See Page:
lpr-filename	**printer**	347
	protocol	347
lpr-indent	**printer**	348
	protocol	348
lpr-mode	**printer**	348
	protocol	348
lpr-optimize-copies	**printer**	348
	protocol	348
lpr-print-banner	**printer**	349
	protocol	349
lpr-print-function	**printer**	349
	protocol	349
lpr-restrict-ports	**printer**	350
	protocol	350
lpr-title	**printer**	350
	protocol	350
lpr-width	**printer**	350
	protocol	350
lu-classes	**printer**	314
	printer-pool	316
luname	**fsa**	298
	printer	314
	printer-pool	316
map-to-outline-fonts	**fsa**	299
mark-interrupt-message-page	**fsa**	299
maximum-copies	**printer**	335
	processing	335
maximum-document-size	**printer**	335
	processing	335
maximum-hiperspace-blocks	**printway-fss**	318
maximum-record-size	**netspool-options**	309
	printer	309
message-count-before-dump	**fsa**	299
name	**allocation**	282
	fsa	299
	netspool-eof-rules	308
	netspool-options	309
	printer	315
	printer-pool	316
	printway-fss	318
	printway-options	326
	processing	335
	protocol	350
	psf-fss	355
name-text	**allocation**	282
	printer	282
national-language	**printway-fss**	319

Table 26. Attributes and Valid Object Classes (continued)

Attribute	Object Class	See Page:
netspool-formatting	**netspool-options**	309
	printer	309
no-response-action	**fsa**	299
no-response-notify	**fsa**	300
normal-output-disposition	**allocation**	282
	printer	282
notify	**allocation**	283
	printer	283
nst-trace-dsname	**psf-fss**	355
offset-interrupt-message-page	**fsa**	300
offset-stacking	**fsa**	300
old-style-translation	**printway-fss**	319
omit-line-termination-at-eof	**printer**	326
	printway-options	326
output-bin-map	**printer**	336
	processing	336
output-bin-number	**allocation**	283
	printer	283
output-class	**allocation**	284
	printer	284
overlay-back	**allocation**	284
	printer	284
overlay-front	**allocation**	284
	printer	284
override-3800-default-font	**fsa**	300
owner	**printer**	351
	protocol	351
page-definition	**allocation**	285
	fsa	301
	printer	285
pcl-line-density	**printer**	336
	processing	336
pcl-orientation	**printer**	336
	processing	336
pcl-print-density	**printer**	337
	processing	337
port-number	**fsa**	301
	printer	351
	protocol	351
print-error-messages	**allocation**	285
	fsa	301
	printer	285
print-error-messages-maximum	**allocation**	286
	fsa	301
	printer	286

Table 26. Attributes and Valid Object Classes (continued)

Attribute	Object Class	See Page:
print-error-reporting	**allocation**	286
	fsa	301
	printer	286
print-error-reporting-supported	**printer**	337
	processing	337
print-page-header	**printer**	338
	processing	338
print-queue-name	**printer**	351
	protocol	351
printer-acquire-interval	**fsa**	301
printer-codepage	**printer**	338
	processing	338
printer-connect-interval	**fsa**	302
printer-disconnect-interval	**fsa**	302
printer-ip-address	**fsa**	302
	printer	352
	protocol	352
printer-luname	**printer**	352
	protocol	352
printer-logmode	**printer**	352
	protocol	352
printer-management-mode	**fsa**	302
printer-names	**printer-pool**	317
printer-release-interval	**fsa**	302
printer-release-mode	**fsa**	302
printer-type	**printer**	315
printer-uri	**printer**	353
	protocol	353
printway-bottom-margin	**printer**	339
	processing	339
printway-formatting	**printer**	327
	printway-options	327
printway-page-height	**printer**	339
	processing	339
printway-pagination	**printer**	339
	processing	339
printway-postscript	**printer**	327
	printway-options	327
printway-sosi-mode	**printer**	340
	processing	340
printway-top-margin	**printer**	340
	processing	340
process-mode	**allocation**	286
	printer	286
protocol-type	**printer**	353
	protocol	353

Table 26. Attributes and Valid Object Classes (continued)

Attribute	Object Class	See Page:
prune-double-byte-fonts	**fsa**	303
prune-single-byte-fonts	**fsa**	303
psf-send-default-character	**fsa**	303
recfm	**netspool-options**	310
	printer	310
record-exit	**printer**	328
	printway-options	328
recover-from-font-not-found	**fsa**	303
release-ds-when-repositioning	**fsa**	303
resolution	**allocation**	287
	fsa	303
	printer	287
resource-library	**allocation**	287
	printer	287
response-timeout	**fsa**	303
	printer	328
	printway-options	328
restrict-printable-area	**allocation**	288
	fsa	304
	printer	288
resubmit-for-filtering	**printer**	341
	processing	341
retained-fonts	**fsa**	304
retained-form-definitions	**fsa**	304
retained-object-containers	**fsa**	304
retained-page-definitions	**fsa**	305
retained-page-segments	**fsa**	305
retry-limit	**printer**	329
	printway-options	329
retry-time	**printer**	329
	printway-options	329
room-text	**allocation**	288
	printer	288
save-printer-information	**fsa**	305
scs-automatic-page-orientation	**printer**	341
	processing	341
scs-bottom-margin	**printer**	342
	processing	342
scs-horizontal-tabs	**printer**	342
	processing	342
scs-left-margin	**printer**	343
	processing	343
scs-maximum-line-length	**printer**	343
	processing	343
scs-maximum-page-length	**printer**	343
	processing	343

Table 26. Attributes and Valid Object Classes (continued)

Attribute	Object Class	See Page:
scs-right-margin	printer processing	344 344
scs-top-margin	printer processing	344 344
scs-vertical-tabs	printer processing	345 345
segment-pages	allocation printer	288 288
send-messages-to-sysout	fsa	305
server-user-options	printer protocol	353 353
set-3800-dataset-header-origin	fsa	306
set-3800-dataset-origin	fsa	306
set-3800-job-header-origin	fsa	306
set-3800-job-trailer-origin	fsa	306
set-3800-messages-origin	fsa	306
snmp-reporting	fsa	306
successful-retention-period	printer printway-options	329 329
suppress-copy-marks	fsa	307
table-reference-characters	allocation printer	289 289
tcpip-job-name	printway-fss psf-fss	319 355
title-text	allocation printer	289 289
trace-mode	fsa printway-fss	307 320
trace-prompt	printway-fss psf-fss	320 356
trace-table-size	fsa printway-fss psf-fss	308 320 356
translate-document-header	printer printway-options	330 330
translate-document-trailer	printer printway-options	330 330
translation-dataset-qualifier	printer processing	345 345
transparent-data-character	printer printway-options	330 330
universal-character-set	allocation printer	289 289
userdata	allocation printer	290 290

Table 26. Attributes and Valid Object Classes (continued)

Attribute	Object Class	See Page:
vtam-checkpoint-pages	**printer**	354
	protocol	354
vtam-send-as-transparent	**protocol**	354
x-image-shift-back	**allocation**	290
	printer	290
x-image-shift-front	**allocation**	291
	printer	291
y-image-shift-back	**allocation**	291
	printer	291
y-image-shift-front	**allocation**	291
	printer	291

Attributes for Allocation Object Class

This section lists the attributes that are valid when you create Allocation
components, which are in object class **allocation**. These attributes are also valid for
the **printer** object class.

Required Attributes
No attributes are required; however, if you plan to use Print Interface or NetSpool,
you must specify the attributes that correspond to the JES work-selection criteria
defined for the program that you want to process the output data sets from the JES
spool. That is, if IP PrintWay is to process the data sets, specify the JES
work-selection criteria defined for the IP PrintWay FSA; if PSF for OS/390 is to
process the data sets, specify the JES work-selection criteria for the PSF FSA.

address-text
This **multi-valued, list** attribute specifies the address that is printed on the
separator pages for a data set.

Allowed Values: You can enter 1–4 values. Each value is a combination of 1–60
letters (a–z, A–Z), numbers (0–9), blanks, and special characters (such as: @ $ # ,
* - /). If a value contains blanks or special characters, enclose it in double quotes. If
you specify more than one value, separate the values by spaces and enclose the
list of values in braces, for example:

```
address-text={"6300 Diagonal Hwy." "Boulder, CO" 80301}
```

This example uses three values, corresponding to three address lines.

Default Value: No default values.

Usage Guidelines:
- Whether the text specified by this attribute is printed depends on how the system
  administrator configures the separator sheet.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode**
  attribute is **to-remote-psf**.
- This attribute is equivalent to the ADDRESS parameter of the OUTPUT JCL
  statement.

building-text
This **single-valued** attribute specifies the building location that is printed on the
separator pages for a data set.

Allowed Values: You can enter a combination of 1–60 letters (a–z, A–Z), numbers (0–9), blanks, and special characters (such as: @ $ # , * - /). If the value contains blanks or special characters, enclose it in double quotes, for example:

```
building-text="Building 003"
```

Default Value: No default value.

Usage Guidelines:

- Whether the text specified by this attribute is printed depends on how the system administrator configures the separator sheet.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- This attribute is equivalent to the BUILDING parameter of the OUTPUT JCL statement.

burster-trimmer-stacker

This **single-valued** attribute indicates whether forms printed on a printer equipped with a burster-trimmer-stacker are left in continuous fanfold or are separated, trimmed, and stacked in single sheets.

Allowed Values: You can enter one of these fixed values:

yes The forms are burst, trimmed, and stacked.

no The forms are left in continuous fanfold.

Default Value: The installation default determines if the forms are burst, trimmed, and stacked.

Usage Guidelines:

- This attribute does not apply to IP PrintWay printer definitions.
- This attribute is equivalent to the BURST parameter of the OUTPUT and DD JCL statements.

chars

This **multi-valued, list** attribute specifies the names of the coded fonts that are used to print a data set on a printer.

Allowed Values: You can enter 1–4 coded font names. Each name is a combination of 1–4 letters (a–z, A–Z), numbers (0–9), and special characters (# $ @). Blanks and other special characters are not allowed. If a value contains special characters, enclose it in double quotes. Lowercase letters are converted to uppercase.

Refer to *IBM AFP Fonts: Font Summary for AFP Font Collection* for valid coded font names. Omit the **X0** or **XZ** prefix from the coded font name.

If you specify more than one value, separate the values by spaces and enclose the list of values in braces, for example:

```
chars={60DB 60D8}
```

Default Value: The font specified in the page definition is used. If the page definition does not specify a font:

- The transforms use the default font in the transform configuration file; if no font is specified, the transforms use font X060D9.
- PSF uses its default font.

Usage Guidelines:

- This attribute applies to documents printed on IBM AFP printers and documents converted by the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- Some coded fonts have six-character names, not counting the prefix. Refer to *IBM AFP Fonts: Font Summary for AFP Font Collection* for the four-character alternate coded font name.
- PSF for OS/390 and the transforms use this attribute only if the page definition used to print the job does not specify fonts. If you specify fonts with this attribute and the page definition also specifies fonts, PSF for OS/390 and the transforms use the fonts that are named in the page definition. PSF, however, uses the font in this attribute if the default page definition is used.
- If you specify more than one coded font with the **chars** attribute, the job must contain either shift-out-shift-in (SOSI) codes or table reference characters (TRCs) in order to use coded fonts other than the first one. IBM recommends that you do not mix SOSI codes and TRCs.
  - If the job contains TRCs, you must specify the **table-reference-characters** attribute value as **true**. PSF for OS/390 and the transforms use the TRC characters to select the corresponding coded font specified with the **chars** attribute.
  - If the job contains SOSI codes, PSF for OS/390 and the transforms use the first coded font specified with the **chars** attribute as the single-byte font and the second coded font as the double-byte font.

  Refer to *AFP: Programming Guide and Line Data Reference* and *PSF for OS/390 & z/OS: User's Guide* for more information about using multiple coded fonts.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- This attribute is equivalent to the CHARS parameter of the OUTPUT and DD JCL statements.

checkpoint-pages

This **single-valued** attribute specifies the number of pages you want between checkpoints that PSF takes while processing a data set.

Allowed Values: You can enter an integer from 1 to 32767.

Default Value: JES uses your system default. If no system default exists, PSF does not record checkpoints.

Usage Guidelines:

- If you specify a value for this attribute and for **checkpoint-seconds**, JES determines which value to use.
- This attribute does not apply to IP PrintWay printer definitions.
- This attribute is equivalent to the CKPTPAGE parameter of the OUTPUT JCL statement.

checkpoint-seconds

This **single-valued** attribute specifies the number of seconds you want between checkpoints that PSF takes while processing a data set.

Allowed Values: You can enter an integer from 1 to 32767.

Default Value: JES uses your system default. If no system default exists, PSF does not record checkpoints.

Usage Guidelines:

- If you specify a value for this attribute and for **checkpoint-pages**, JES determines which value to use.
- This attribute does not apply to IP PrintWay printer definitions.
- This attribute is equivalent to the CKPTSEC parameter of the OUTPUT JCL statement.

color-map

This **single-valued** attribute specifies the name of the object container for the color mapping table resource that PSF for OS/390 uses to print a data set containing color translation information. This attribute is only used when sending output to a printer that supports color mapping table resources.

Allowed Values: You can enter a combination of 1–8 letters (a–z, A–Z), numbers (0–9), and special characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. If the value contains special characters, enclose it in double quotes. Lowercase letters are converted to uppercase.

Default Value: If the color map is not specified on this panel or the user does not specify it on the JCL, PSF uses **M1RESET** for the color mapping table.

Usage Guidelines:

- This attribute does not apply to IP PrintWay printer definitions.
- This attribute is equivalent to the COLORMAP parameter of the OUTPUT JCL statement.
- IBM recommends a prefix of M1 for color mapping table resources.

com-setup-member

This **single-valued** attribute specifies the name of the object container for the microfilm setup resource that PSF for OS/390 uses to print data on a microfilm device. This attribute is only used when sending output to a microfilm device.

Allowed Values: You can enter a combination of 1–8 letters (a–z, A–Z), numbers (0–9), and special characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. If the value contains special characters, enclose it in double quotes.

Default Value: No default value.

Usage Guidelines:

- IBM recommends a prefix of **H1** for microfilm setup resources.
- This attribute does not apply to IP PrintWay printer definitions.
- This attribute is equivalent to the COMSETUP parameter of the OUTPUT JCL statement.

copies

This **single-valued** attribute specifies the number of collated copies you want to print.

Allowed Values: You can enter an integer from 1 to 32640.

Default Value: **1**

Usage Guidelines:

- PSF sends the entire document to the printer the specified number of times
- If IP PrintWay transmits the data set to a remote printer, only one copy prints when you print to Internet Printing Protocol (IPP) printers that do not support the IPP **copies** job attribute or to VTAM-controlled printers.
- If IP PrintWay sends the data set to an e-mail destination, it sends only one copy.
- If you specify a value greater than 255, NetSpool prints 255 copies.
- PSF ignores this attribute if you specify one or more values for the **copy-group** attribute.
- This attribute is similar to the COPIES parameter of the OUTPUT and DD JCL statements.

copy-group

This **multi-valued, list** attribute specifies the number of copies of each page of the data set you want printed consecutively before the next page is printed. You can enter 1–8 copy groups. The data set is sent to the printer once for each copy group. The total number of copies equals the sum of the copy groups.

Allowed Values: You can enter 1–8 integers, each from 1 to 255. If you specify more than one value, separate the values by spaces and enclose the list of values in braces.

Example:

```
copy-group={1 3 2}
```

When a data set containing 3 pages is printed, copy group 1 prints 1 copy of each page; copy group 2 prints 3 copies of page 1, 3 copies of page 2, and then 3 copies of page 3; and finally, copy group 3 prints 2 copies of page 1, 2 copies of page 2, and then 2 copies of page 3.

Default Value: No default values.

Usage Guidelines:

- Each individual copy group or the sum of all copy groups cannot be greater than 255.
- When a copy group is specified, the **copies** attribute is ignored.
- This attribute does *not* apply to IP PrintWay printer definitions.
- This attribute is similar to the COPIES parameter of the OUTPUT and DD JCL statements.

department-text

This **single-valued** attribute specifies the department identifier that is printed on the separator pages for a data set.

Allowed Values: You can enter a combination of 1–60 letters (a–z, A–Z), numbers (0–9), blanks, and special characters (such as: @ $ # , * - /). If the value contains blanks or special characters, enclose it in double quotes, for example:

```
department-text="Payroll Dept."
```

Default Value: No default value.

Usage Guidelines:

- Whether the text specified by this attribute is printed depends on how the system administrator configures the separator sheet.

- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- This attribute is equivalent to the DEPT parameter of the OUTPUT JCL statement.

description

This **single-valued** attribute describes the printer definition. This attribute is not required; however, the description can help users select a printer.

Allowed Values: You can enter a combination of 1–256 letters (a–z, A–Z), numbers (0–9), blanks, and special characters (such as # $ @ ! = / -). If the value contains blanks or special characters, enclose it in double quotes, for example:

```
description="IBM 4019 LaserPrinter PS39"
```

Default Value: No default value.

destination

This **single-valued** attribute specifies a destination name for output data sets.

Allowed Values: You can enter a combination of 1–8 letters (a–z, A–Z), numbers (0–9), and special characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. If the value contains special characters, enclose it in double quotes. Lowercase letters are converted to uppercase.

Default Value: JES determines the value.

Usage Guidelines:

- If you also specify the **jes-node** attribute, it becomes part of the DEST parameter for allocation: DEST=*jes-node.dest*.
- When you specify **dcf-routing =yes**, IP PrintWay uses this value, if specified, for printer selection. See the **dcf-routing** attribute in "Attributes for Printer Object Class" on page 310 for more information.
- This attribute is equivalent to the DEST parameter of the OUTPUT JCL statement.

duplex

This **single-valued** attribute indicates whether printing is done on both sides of the sheet and if so, how.

Allowed Values: You can enter one of these fixed values:

no   Prints on the front side of the paper only.

yes   Prints on both sides of the paper so the top edge of side 1 is the top edge of side 2.

tumble   Prints on both sides of the paper but tumbles the print so the top edge of side 1 is the bottom edge of side 2.

Default Value: The value in the form definition or the internal copy group is used.

Usage Guidelines:

- This attribute applies to documents printed on IBM AFP printers and documents converted by the AFP to PCL, AFP to PDF, or AFP to PostScript transform.

- If IP PrintWay transmits the data set to a remote printer, the document is printed on both sides only if the line printer daemon (LPD) or the IPP server for the target printer supports duplex printing.
- IP PrintWay sends this attribute to the remote printer if **lpr-mode=to-remote-psf**.
- This attribute is equivalent to the DUPLEX parameter of the OUTPUT JCL statement.

error-disposition
This **single-valued** attribute indicates the disposition of a data set when PSF for OS/390 terminates the data set because an error occurs during printing.

Allowed Values: You can enter one of these fixed values:

default   Take the standard PSF action.

hold   Hold the data set on the JES spool until it is released by the system operator.

quit   Release the data set to JES. JES handles the data set based on the value of the **normal-output-disposition** attribute.

Default Value: **default**

Usage Guidelines:
- This attribute does not apply to IP PrintWay printer definitions.
- This attribute is equivalent to the PRTERROR parameter of the OUTPUT JCL statement.

flash-count
This **single-valued** attribute specifies the number of copies on which the forms flash (specified by the **flash-name** attribute) is to be printed, beginning with the first copy printed. A forms flash is a 3800 printer hardware frame that prints a photographic negative on selected forms.

Allowed Values: You can enter an integer from 0 to 255.

Default Value: **255**

Usage Guidelines: This attribute is similar to the FLASH parameter of the OUTPUT and DD JCL statements.

flash-name
This **single-valued** attribute specifies the name of the forms flash used to print a data set. A forms flash is a 3800 printer hardware frame that prints a photographic negative on selected forms. PSF ignores this attribute for all printers but the 3800 printer. The number specified by the **flash-count** attribute determines how many copies of the data set are printed with the forms flash.

Allowed Values: You can enter a combination of 1–4 letters (a–z, A–Z), numbers (0–9), and special characters (# $ @). Blanks and other special characters are not allowed. If the value contains special characters, enclose it in double quotes. Lowercase letters are converted to uppercase.

Default Value: No default value.

Usage Guidelines: This attribute is similar to the FLASH parameter of the OUTPUT and DD JCL statements.

form-definition

This **single-valued** attribute specifies the name of the form definition that defines how a data set is printed.

Allowed Values: You can enter a combination of 1–6 letters (a–z, A–Z), numbers (0–9), and special characters (# $ @). 7 or 8 characters are allowed if the first two are **F1**. Blanks and other special characters are not allowed. If the value contains special characters, enclose it in double quotes. Lowercase letters are converted to uppercase.

Default Value: PSF for OS/390 and the transforms use the first inline form definition. If none exists:

- PSF uses the installation-defined default form definition.
- The transforms use the default form definition in the transform configuration file, **aopxfd.conf**. If a default form definition is not specified in the file, the transforms use F1CP0110.

Usage Guidelines:

- This attribute applies to documents printed on IBM AFP printers and documents converted by the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- To correctly print documents that contain an inline form definition when using the AFP Printer Driver for Windows, do not specify a value for this attribute.
- If the job submitter specifies a form definition, it overrides the form definition in this attribute.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- This attribute is equivalent to the FORMDEF parameter of the OUTPUT JCL statement.

forms

This **single-valued** attribute specifies the name of the form on which data sets are printed.

Allowed Values: You can enter a combination of 1–8 letters (a–z, A–Z), numbers (0–9), and special characters (# $ @). Blanks and other special characters are not allowed. If the value contains special characters, enclose it in double quotes. Lowercase letters are converted to uppercase.

Default Value: JES determines the default value.

Usage Guidelines:

- If the job submitter specifies a form name, it overrides the form name in this attribute.
- When you specify **dcf-routing = yes**, IP PrintWay uses this value, if specified, for printer selection. See the **dcf-routing** attribute in "Attributes for Printer Object Class" on page 310 for more information.
- This attribute is equivalent to the FORMS parameter of the OUTPUT JCL statement.

forms-control-buffer

This **single-valued** attribute specifies the name of the forms control buffer (FCB) a printer uses to control the vertical format when printing a data set.

Allowed Values: You can enter a combination of 1–4 letters (a–z, A–Z), numbers (0–9), and special characters (# $ @). Blanks and other special characters are not

allowed. If the value contains special characters, enclose it in double quotes. Lowercase letters are converted to uppercase.

Default Value: JES determines the default value.

Usage Guidelines:
- If this is an IP PrintWay printer definition, set the **printway-formatting** attribute to **use-fcb** if you want IP PrintWay to use the forms control buffer.
- This attribute is equivalent to the FCB parameter of the OUTPUT and DD JCL statements.

group-identifier

This **single-valued** attribute specifies the name that JES assigns to the output group for the data set. JES always assigns each data set that NetSpool and Print Interface allocate on the JES spool to a separate JES output group even though you specify a name in this attribute.

Allowed Values: You can enter a combination of 1–8 letters (a–z, A–Z) or numbers (0–9). Blanks and special characters are not allowed. If the value contains special characters, enclose it in double quotes. Lowercase letters are converted to uppercase.

Default Value: No default value.

Usage Guidelines: This attribute is equivalent to the GROUPID parameter of the OUTPUT JCL statement.

hold

This **single-valued** attribute indicates the disposition of output data sets that Print Interface or NetSpool allocates on the JES spool.

Allowed Values: You can enter one of these fixed values:

yes or **true** Hold the data set until it is released by the system operator. Then print the data set and purge it.

no or **false** In JES2, use the value specified in the **normal-output-disposition** attribute. In JES3, print the data set and then purge it.

Default Value: The JES default is **no**.

Usage Guidelines: This attribute is equivalent to the HOLD parameter of the DD JCL statement.

input-tray-number

This **single-valued** attribute specifies a number that identifies the paper source used to print a data set. To determine the tray numbers that your printer supports, see its documentation.

Allowed Values: You can enter an integer from 1 to 255.

Default Value: The default is the number in the form definition or the printer's default paper source.

Usage Guidelines:
- This attribute applies to documents printed on IBM AFP printers and documents converted by the AFP to PCL, AFP to PDF, or AFP to PostScript transform.

- The transforms map this tray number to the tray number of the PCL or PostScript printer, using tray-mapping values specified in the transform configuration file, **aopxfd.conf**.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- The input tray that a job submitter specifies overrides this attribute.
- This attribute is equivalent to the INTRAY parameter of the OUTPUT JCL statement.

jes-form-length

This **single-valued** attribute indicates the paper length in inches or centimeters. This field is used to change the paper length of the physical paper at the printer without reconfiguring the printer. The value must contain at least one digit and an abbreviation for inches or centimeters.

Allowed Values: You can enter a value in the format *nn.mmmuu*, where:

nn	is a number from 0 to 99. You must specify at least one digit to the left of the decimal point.
mmm	is a number from 0 to 999. The decimal point and the digits following it are optional.
uu	is one of these fixed values:

in	Inches
cm	Centimeters

Examples:

```
jes-form-length=9.5in
jes-form-length=12.345cm
jes-form-length=2in
jes-form-length=0.5cm
```

Default Value: JES uses the printer's default paper length.

Usage Guidelines: This attribute is equivalent to the FORMLEN parameter of the OUTPUT JCL statement.

jes-maximum-line-count

This **single-valued** attribute specifies the maximum number of lines printed on each output page.

Allowed Values: You can enter an integer from 0 to 255.

Default Value: JES determines the default.

Usage Guidelines: This attribute is equivalent to the LINECT parameter of the OUTPUT JCL statement.

jes-node

This **single-valued** attribute specifies the name of the destination node to which JES sends the data sets. This node is used with the value of the **destination** attribute as part of the JCL DEST parameter: DEST=*jesnode.dest*.

Allowed Values: You can enter a combination of 1–8 letters (a–z, A–Z), numbers (0–9), and special characters (# $ @). Blanks and other special characters are not

allowed. If the value contains special characters, enclose it in double quotes. Lowercase letters are converted to uppercase.

Default Value: JES uses the node from which the job was submitted.

Usage Guidelines: This attribute is similar to the DEST=*nodename.name* parameter of the OUTPUT JCL statement.

jes-priority

This **single-valued** attribute specifies a number that determines the order in which a data set is placed in the print queue. A data set with a higher number has a higher priority and is printed sooner.

Allowed Values: You can enter an integer from 0 to 255.

Default Value: JES determines the default.

Usage Guidelines:

- If the job submitter specifies a priority, it overrides the priority in this attribute.
- Whether JES honors this priority depends upon how an FSA is defined to JES.
- This attribute is equivalent to the PRTY parameter of the OUTPUT JCL statement.

jes-threshold

This **single-valued** attribute specifies a number that indicates the maximum size allowed for a data set to print it as one unit of work. The size is calculated as the number of records in a data set multiplied by the number of copies requested. When this size exceeds the **jes-threshold** value, the data set is printed as two units of work.

Allowed Values: You can enter an integer from 1 to 99999999.

Default Value: JES uses the installation default specified at initialization.

Usage Guidelines: This attribute is equivalent to the THRESHLD parameter of the OUTPUT JCL statement.

jes-writer

This **single-valued** attribute specifies the name of an external writer that processes the data sets. An external writer is an IBM- or installation-written program.

Allowed Values: You can enter a combination of 1–8 letters (a–z, A–Z), numbers (0–9) and special characters (# $ @). Blanks and other special characters are not allowed. If the value contains special characters, enclose it in double quotes. Lowercase letters are converted to uppercase.

Default Value: No default value.

Usage Guidelines: This attribute is equivalent to the WRITER parameter of the OUTPUT JCL statement.

label-data-pages

This **single-valued** attribute indicates whether the security label is printed on each page of printed output. The security label represents a security level and categories defined to RACF. The security label is determined by the SECLABEL parameter of the JOB JCL statement.

Allowed Values: You can enter one of these fixed values:

yes The security label determined by SECLABEL is printed.

no The security label is not printed.

Default Value: PSF sets the default based on whether PSFMPL is active.

Usage Guidelines:
- This attribute does not apply to IP PrintWay printer definitions.
- This attribute is equivalent to the DPAGELBL parameter of the OUTPUT JCL statement.

name
This **single-valued** attribute specifies the name of the component.

Note: This is a *non-settable* attribute. Do *not* specify the **name** attribute on the PIDU **create**, **force-create**, or **modify** command; instead, specify the name as an operand on the command. However, you can specify the **name** attribute when you construct a condition for the **where** predicate on the **list** and **export** commands.

Allowed Values: Any combination of 1–17 letters (a–z, A–Z), numbers (0–9), and special characters (such as $ # @ . - = /). Blank characters are not allowed. If the value contains special characters, enclose it in double quotes.

Default Value: None.

name-text
This **single-valued** attribute specifies the requestor name that is printed on the separator pages for a data set.

Allowed Values: You can enter a combination of 1–60 letters (a–z, A–Z), numbers (0–9), blanks, and special characters (such as: @ $ # , * - /). If the value contains blanks or special characters, enclose it in double quotes, for example:

```
name-text="R. Roper"
```

Default Value: No default value.

Usage Guidelines:
- Whether the text specified by this attribute is printed depends on how the system administrator configures the separator sheet.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- This attribute is equivalent to the NAME parameter of the OUTPUT JCL statement.

normal-output-disposition
This **single-valued** attribute indicates the normal output disposition of sysout data sets that Print Interface or NetSpool allocate on the JES spool.

Allowed Values: You can enter one of these fixed values:

write Print the data set, and then purge it.

hold Hold the data set until released; then print the data set and purge it.

keep Print the data set; then hold it until it is released.

leave Hold the data set until released; then print the data set and hold it until it is released.

purge Delete the data set without printing. (not recommended)

Default Value: JES2 uses the installation default for normal disposition for the sysout class of the data set.

Usage Guidelines:
- This attribute is similar to the OUTDISP parameter of the OUTPUT JCL statement.
- This attribute applies only to JES2. JES3 ignores it.
- JES2 ignores this attribute if **hold=yes**.

notify

This **multi-valued, list** attribute specifies the user IDs you want notified when the printer finishes printing your job. The notification sent to the specified user IDs indicates whether the job printed successfully.

Allowed Values: You can enter 1–4 values in the format *node.userid*, where:

node The node associated with the user ID. Specify from 1–8 alphanumeric or national ($, #, @) characters. Lowercase letters are converted to uppercase.

 If you do not specify a node, the node from which the job was submitted is used.

userid The user ID. Specify from 1–8 alphanumeric or national ($, #, @) characters; the first character must be alphabetic or national. Lowercase letters are converted to uppercase.

If you specify more than one value, separate the values by spaces and enclose the list of values in braces, for example:

```
notify={boulder.martha charlie}
```

Default Value: If you do not specify at least one user ID, no notification is issued. If you specify a user ID without a node, the node from which the job was submitted is used.

Usage Guidelines: This attribute is equivalent to the NOTIFY parameter of the OUTPUT JCL statement.

output-bin-number

This **single-valued** attribute identifies the output bin a printer uses. To determine the bin numbers that your printer supports, see its documentation.

Allowed Values: You can enter an integer from 1 to 65535.

Default Value: The default is the output bin number in the form definition or the printer's default output bin.

Usage Guidelines:
- This attribute applies to documents printed on IBM AFP printers and documents converted by the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.

- The output bin that a job submitter specifies overrides this attribute.
- This attribute is equivalent to the OUTBIN parameter of the OUTPUT JCL statement.

output-class

This **single-valued** attribute specifies a JES output class for output data sets.

Allowed Values: You can enter a letter (a–z, A–Z) or number (0–9). Special characters are not allowed. Lowercase letters are converted to uppercase.

Default Value: JES determines the default value.

Usage Guidelines:

- When you specify **dcf-routing = yes**, IP PrintWay uses this value, if specified, for printer selection. See the **dcf-routing** attribute in "Attributes for Printer Object Class" on page 310 for more information.
- This attribute is equivalent to the CLASS parameter of the OUTPUT JCL statement.

overlay-back

This **single-valued** attribute specifies the name of the predefined data (lines, shading, text, boxes, or logos) that PSF for OS/390 and the transforms print on the back side of a page when the data set is duplexed.

Allowed Values: You can enter a combination of 1–8 letters (a–z, A–Z), numbers (0–9), and special characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. If the value contains special characters, enclose it in double quotes. Lowercase letters are converted to uppercase.

Default Value: No default value.

Usage Guidelines:

- This attribute applies to documents printed on IBM AFP printers and documents converted by the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- This overlay prints in addition to any overlay that the form definition specifies.
- If the job submitter specifies a back overlay, it overrides this overlay.
- This attribute is equivalent to the OVERLAYB parameter of the OUTPUT JCL statement.
- IBM recommends a prefix of O1 for overlay resources.

overlay-front

This **single-valued** attribute specifies the name of the predefined data (lines, shading, text, boxes, or logos) that PSF for OS/390 and transforms print on the front side of a page.

Allowed Values: You can enter a combination of 1–8 letters (a–z, A–Z), numbers (0–9), and special characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. If the value contains special characters, enclose it in double quotes. Lowercase letters are converted to uppercase.

Default Value: No default value.

Usage Guidelines:

- This attribute applies to documents printed on IBM AFP printers and documents converted by the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- This overlay prints in addition to any overlay that the form definition specifies.
- If the job submitter specifies a front overlay, it overrides this overlay.
- This attribute is equivalent to the OVERLAYF parameter of the OUTPUT JCL statement.
- IBM recommends a prefix of O1 for overlay resources.

page-definition

This **single-valued** attribute specifies the name of the page definition that defines how a data set is printed.

Allowed Values: You can enter a combination of 1–6 letters (a–z, A–Z), numbers (0–9), and special characters (# $ @). 7 or 8 characters are allowed if the first two are **P1**. Blanks and other special characters are not allowed. If the value contains special characters, enclose it in double quotes. Lowercase letters are converted to uppercase.

Default Value: PSF for OS/390 and the transforms use the first inline page definition. If none exists:

- PSF uses the installation-defined default page definition
- The transforms use the default page definition in the transform configuration file, **aopxfd.conf**. If a default page definition is not specified in the file, the transforms use P1P08682.

Usage Guidelines:

- This attribute applies to documents printed on IBM AFP printers and documents converted by the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- If the job submitter specifies a page definition, it overrides the page definition in this attribute.
- This attribute is equivalent to the PAGEDEF parameter of the OUTPUT JCL statement.

print-error-messages

This **single-valued** attribute indicates whether PSF for OS/390 should print error messages.

Allowed Values: You can enter one of these fixed values:

yes   Error messages are printed until the value of the **print-error-messages-maximum** attribute is reached; then processing of the data set stops.

no   Error messages are not printed. The data set is processed until complete unless a terminating error occurs.

Default Value: PSF for OS/390 determines the default.

Usage Guidelines:

- This attribute does not apply to IP PrintWay printer definitions.

- This attribute is similar to the PIMSG parameter of the OUTPUT JCL statement.

print-error-messages-maximum

This **single-valued** attribute specifies the maximum number of message groups that are printed when the value of the **print-error-messages** attribute is **yes**. When the maximum number is reached, processing of the data set stops.

Allowed Values: You can enter an integer from 0 to 999.

Default Value: **16**

Usage Guidelines:
- A value of **0** means that the data set is processed until complete unless a terminating error occurs. All message groups are printed.
- This attribute does not apply to IP PrintWay printer definitions.
- This attribute is similar to the PIMSG parameter of the OUTPUT JCL statement.

print-error-reporting

This **single-valued** attribute indicates whether the printer reports character and position errors. Character errors are caused by trying to use a code point that is not assigned to a character in a font. Position errors are caused by trying to print outside the printable area.

Allowed Values: You can enter one of these fixed values:

none   Do not report any character or position errors.

all   Report all character and position errors.

character   Report only character errors.

position   Report only position errors.

Default Value: **none**

Usage Guidelines:
- If you enter **all**, **character**, or **position**, it must be one of the values of the **print-error-reporting-supported** attribute of the Processing component of the printer definition.
- This attribute does not apply to IP PrintWay printer definitions.
- This attribute is similar to the DATACK parameter of the OUTPUT JCL statement.

process-mode

This **single-valued** attribute specifies the processing mode for printing a data set.

Allowed Values: You can enter a combination of 1–8 letters (a–z, A–Z) or numbers (0–9). Blanks and special characters are not allowed. These fixed values have special meaning:

line   The data set is scheduled to a line-mode printer.

page   The data set is scheduled to a page-mode printer.

sosi1   In a line-mode data set containing both single-byte and double-byte characters, PSF for OS/390 converts each shift-out, shift-in code to a blank and a Set Coded Font Local text control.

sosi2   In a line-mode data set containing both single-byte and double-byte characters, PSF for OS/390 converts each shift-out, shift-in code to a Set Coded Font Local text control.

sosi3   In a line-mode data set containing both single-byte and double-byte characters, PSF for OS/390 converts each shift-in code to a Set Coded Font Local text control and two blanks. It converts each shift-out code to a Set Coded Font Local text control.

Default Value: JES determines the default.

Usage Guidelines:
- This attribute applies to documents printed on IBM AFP printers and documents converted by the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- For the shift-out, shift-in process to work correctly, either the **chars** attribute or the page definition used to print the job must specify two coded fonts. The first must be a single-byte font, and the second must be a double-byte font.
- If the job submitter specifies a shift-in/shift-out value, it overrides this attribute.
- IBM recommends that you do not mix SOSI codes and TRCs in the same job.
- This attribute is equivalent to the PRMODE parameter of the OUTPUT JCL statement.

resolution
This **single-valued** attribute indicates the resolution at which the output was formatted. PSF for OS/390 uses this value to choose the correct resolution system library that has previously been defined by the system programmer.

Allowed Values: You can enter one of these fixed values:

240   The data set was formatted with resources at 240 pels per inch.

300   The data set was formatted with resources at 300 pels per inch.

Default Value: The system default library is used.

Usage Guidelines: This attribute does not apply to IP PrintWay printer definitions.

resource-library
This **multi-valued, list** attribute specifies the names of user libraries that contain the AFP resources PSF for OS/390 and the AFP to PCL, AFP to PDF, or AFP to PostScript transform use to process data sets. The specified libraries are searched before any other resource libraries defined to PSF or to the transforms. The resources contained in the libraries include fonts, page segments, overlays, page definitions, and form definitions. For PSF to search the specified libraries for page definitions or form definitions, you or the job submitter must specify a value for the **page-definition** or **form-definition** attribute.

Allowed Values: You can enter 1–8 valid library names. If the value contains special characters other than periods, enclose it in double quotes. Lowercase letters are converted to uppercase.

If you specify more than one value, separate the values by spaces and enclose the list of values in braces, for example:
```
resource-library={font.library overlay.library}
```

Default Value: None.

Usage Guidelines:

allocation and printer

- This attribute applies to documents printed on IBM AFP printers and documents converted by the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- If the job submitter specifies a user library, it overrides this attribute.
- This attribute is equivalent to the USERLIB parameter of the OUTPUT JCL statement.

restrict-printable-area

This **single-valued** attribute indicates whether an area on each page of printed output is reserved for the security label. When an area is reserved for a security label, the printed output is shifted on each page. You cannot print data in the reserved area.

Allowed Values: You can enter one of these fixed values:

yes   An area on each page is reserved for the security label.

no   An area is not reserved for the security label.

Default Value: PSF sets the default based on whether PSFMPL is active.

Usage Guidelines:

- This attribute does not apply to IP PrintWay printer definitions.
- This attribute is equivalent to the SYSAREA parameter of the OUTPUT JCL statement.

room-text

This **single-valued** attribute specifies the room name that is printed on the separator pages for a data set.

Allowed Values: You can enter a combination of 1–60 letters (a–z, A–Z), numbers (0–9), blanks, and special characters (such as: @ $ # , * - /). If the value contains blanks or special characters, enclose it in double quotes.

Default Value: No default value.

Usage Guidelines:

- Whether the text specified by this attribute is printed depends on how the system administrator configures the separator sheet.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- This attribute is equivalent to the ROOM parameter of the OUTPUT JCL statement.

segment-pages

This **single-valued** attribute specifies the maximum number of pages produced in a data set segment before it is sent for printing.

Allowed Values: You can enter an integer from 1 to 99999. For example, a value of **100** means that each data segment contains 100 pages. If the data set produces 400 pages, four separate segments of 100 pages each are produced for printing.

Default Value: No default value. The data set is not segmented.

Usage Guidelines: This attribute is equivalent to the SEGMENT parameter of the DD JCL statement.

table-reference-characters

This **single-valued** attribute indicates whether data sets printed on this printer contain table-reference characters (TRCs). A TRC selects a font character set named by the **chars** attribute or the page definition used to print the job. A TRC is the first character of each line in the data set unless the first character is a carriage control character. In that case, the TRC is the second character.

Allowed Values: You can enter one of these fixed values:

yes or **true**   Data sets contain TRCs.

no or **false**   Data sets do not contain TRCs.

Default Value: **no**

Usage Guidelines:
- This attribute applies to documents printed on IBM AFP printers and documents converted by the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- If the value of this attribute is **yes** and the page definition does not specify fonts, you must specify fonts with the **chars** attribute.
- If the data set contains TRCs and the value of this attribute is **no**, your printed output will not be correct. PSF for OS/390 and the transforms will interpret the TRCs as text characters.
- IBM recommends that you do not mix SOSI codes and TRCs in the same job.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- This attribute is equivalent to the TRC parameter of the OUTPUT JCL statement.

title-text

This **single-valued** attribute specifies the description of the output that can be printed on the separator pages for a data set. IP PrintWay also sends it to the printer's LPD for printing on a separator page generated by the printer's LPD. It also is the subject of e-mails when the job submitter does not specify another title.

Allowed Values: You can enter a combination of 1–60 letters (a–z, A–Z), numbers (0–9), blanks, and special characters (such as: @ $ # , * - /). If the value contains blanks or special characters, enclose it in double quotes, for example:

```
title-text="Annual Report"
```

Default Value: No default value.

Usage Guidelines:
- Whether the text specified by this attribute is printed depends on how the administrator configures the separator sheet or how the LPD is implemented.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- This attribute is equivalent to the TITLE parameter of the OUTPUT JCL statement.

universal-character-set

This **single-valued** attribute specifies a code for the universal character set (UCS) a printer uses to print data sets.

allocation and printer

> ***Allowed Values:*** You can enter a combination of 1–4 letters (a–z, A–Z), numbers (0–9), and special characters (# $ @). Blanks and other special characters are not allowed. If the value contains special characters, enclose it in double quotes. Lowercase letters are converted to uppercase.
>
> ***Default Value:*** JES determines the default.
>
> ***Usage Guidelines:*** This attribute is equivalent to the UCS parameter of the OUTPUT and DD JCL statements.

userdata

This **multi-valued, list** attribute specifies installation-defined information for the user.

> ***Allowed Values:*** You can enter 1–16 values. Each value is a combination of 1–60 letters (a–z, A–Z), numbers (0–9), blanks, and special characters (such as: @ $ # , * - /). If a value contains blanks or special characters, enclose it in double quotes. If you specify more than one value, separate the values by spaces and enclose the list of values in braces, for example:

```
userdata={UserValue "LocalKey=Installation Data" "Installation Data"}
```

> ***Default Value:*** No default value.
>
> ***Usage Guidelines:*** This attribute is equivalent to the USERDATA parameter of the OUTPUT JCL statement.

x-image-shift-back

This **single-valued** attribute specifies a decimal number that indicates how much the logical page is shifted horizontally on the back side of each physical page.

> ***Allowed Values:*** You can enter a number from 000.000 to 999.999, followed by the units. No blank spaces are allowed. The following units are valid:

Unit	Meaning
IN	Inches
CM	Centimeters
MM	Millimeters (default unit)
PELS	Picture elements (1/240 inch)
POINTS	Points (1/72 inch)

For example, you can enter the following values:

```
x-image-shift-back=25.4
x-image-shift-back=2.54CM
x-image-shift-back=1IN
x-image-shift-back=240PELS
x-image-shift-back=72POINTS
```

> ***Default Value:*** The default is the number in the form definition. The default unit is millimeters.
>
> ***Usage Guidelines:***
> - This attribute applies to documents printed on IBM AFP printers and documents converted by the AFP to PCL, AFP to PDF, or AFP to PostScript transform.

- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- The number that a job submitter specifies overrides this attribute.
- This attribute is similar to the OFFSETXB parameter of the OUTPUT JCL statement.

x-image-shift-front

This **single-valued** attribute specifies a decimal number that indicates how much the logical page is shifted horizontally on the front side of each physical page.

Allowed Values: You can enter a number from 000.000 to 999.999, followed by the unit. See "x-image-shift-back" on page 290 for information about allowed units.

Default Value: The default is the number in the form definition. The default unit is millimeters.

Usage Guidelines:
- This attribute applies to documents printed on IBM AFP printers and documents converted by the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- The number that a job submitter specifies overrides this attribute.
- This attribute is similar to the OFFSETXF parameter of the OUTPUT JCL statement.

y-image-shift-back

This **single-valued** attribute specifies a decimal number that indicates how much the logical page is shifted vertically on the back side of each physical page.

Allowed Values: You can enter a number from 000.000 to 999.999, followed by the unit. See "x-image-shift-back" on page 290 for information about allowed units.

Default Value: The default is the number in the form definition.

Usage Guidelines:
- This attribute applies to documents printed on IBM AFP printers and documents converted by the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- The number that a job submitter specifies overrides this attribute.
- This attribute is similar to the OFFSETYB parameter of the OUTPUT JCL statement.

y-image-shift-front

This **single-valued** attribute specifies a decimal number that indicates how much the logical page is shifted vertically on the front side of each physical page.

Allowed Values: You can enter a number from 000.000 to 999.999, followed by the unit. See "x-image-shift-back" on page 290 for information about allowed units.

Default Value: The default is the number in the form definition. The default unit is millimeters.

Usage Guidelines:

allocation and printer

- This attribute applies to documents printed on IBM AFP printers and documents converted by the AFP to PCL, AFP to PDF, or AFP to PostScript transform.
- IP PrintWay sends this attribute to the remote printer if the value of the **lpr-mode** attribute is **to-remote-psf**.
- The number that a job submitter specifies overrides this attribute.
- This attribute is similar to the OFFSETYF parameter of the OUTPUT JCL statement.

Attributes for FSA Object Class

This section lists attributes that are valid when you create FSA definitions, which are in object class **fsa**.

Notes:

1. When you create an FSA definition for PSF for OS/390, all attributes are valid. For complete details about each PSF attribute, including defaults and usage guidelines, refer to *PSF for OS/390 & z/OS: Customization*.

2. When you create an FSA definition for IP PrintWay, only these attributes are valid:
   - **fsa-type**
   - **description**
   - **trace-mode**

3. You can specify some attributes, for example **form-definition**, when you create an FSA definition for PSF and also when you create a printer definition. If the same attribute is specified in both an FSA definition and a printer definition, and either IP PrintWay or NetSpool allocated the print job on the JES spool, PSF uses the value for the attribute specified in the printer definition.

Required Attributes

In order for Infoprint Server to display the correct ISPF panel for an FSA definition, you must specify the **fsa-type** attribute.

PSF for OS/390 requires these attributes in an FSA definition:
- **applid** (when **fsa-type=psf-sna**)
- **form-definition**
- **luname** (when **fsa-type=psf-sna**)
- **page-definition**
- **printer-ip-address** (when **fsa-type=psf-tcpip**)

IP PrintWay does not require any attributes in an FSA definition.

acknowledgement-level

This **single-valued** attribute specifies whether PSF requests an acknowledgement every sheet or every page.

Allowed Values: You can enter one of these fixed values:

page An acknowledgement is requested for every page that is printed (default).

sheet An acknowledgement is requested for every sheet that is printed.

applid

This **single-valued** attribute specifies the name of the VTAM application-program node for an FSA when PSF is printing to an SNA-attached printer in deferred-printing mode.

Allowed Values: You can enter a valid combination of 1–8 letters (a-z, A-Z), numbers (0–9), and special characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. If a value contains special characters, enclose the value in quotes.

blank-compression

This **single-valued** attribute specifies whether PSF should compress data (blanks) in line data sent to printers, including printers attached to PSF/2 or PSF for AIX.

Allowed Values: You can enter one of these fixed values:

yes   Blanks are compressed in line data that contains more than five contiguous blanks.

no   Blanks are not compressed in line data (default).

capture-inline-resources

This **single-valued** attribute specifies whether PSF tells a connected DPF to capture and store inline resources.

Allowed Values: You can enter one of these fixed values:

yes   DPF captures inline resources.

no   DPF does not capture inline resources (default).

channel-buffer-count

This **single-valued** attribute specifies the number of 32 KB buffers that are needed for processing jobs on a channel-attached printer.

Allowed Values: You can enter an integer from 1 to 10000. This value is multiplied by 32 KB (32768 bytes) to determine the total amount of reserved storage.

chars

This **multi-valued, list** attribute specifies the names of the coded fonts that are used to print a data set on a printer.

Allowed Values: You can enter 1–4 coded font names. Each name can be any combination of 1–4 letters (a-z, A-Z), numbers (0–9), and special characters (# $ @). Blanks and other special characters are not allowed. If a value contains special characters, enclose the value in quotes. Lowercase letters are converted to uppercase. Refer to *IBM AFP Fonts: Font Summary for AFP Font Collection* for valid coded font names.

If you specify more than one value, separate the values by spaces and enclose the list of values in braces. For example:

```
chars={GT12 GB12 GI12}
```

close-libraries-when-idle

This **single-valued** attribute specifies whether PSF closes the resource libraries when the printer is idle for 60 seconds.

Allowed Values: You can enter one of these fixed values:

yes   Close the resource libraries when the printer is inactive.

no   Do not close the resource libraries (default).

color-map

This **single-valued** attribute specifies the name of the object container for the color mapping table resource that PSF uses to print a data set containing color translation information.

Allowed Values: You can enter a valid combination of 1–8 letters (a-z, A-Z), numbers (0–9), and special characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. If a value contains special characters, enclose the value in quotes. Lowercase letters are converted to uppercase.

com-setup-member

This **single-valued** attribute specifies the name of the object container for the microfilm setup resource that PSF uses to print data on a microfilm device. This attribute is only used when sending output to a microfilm device.

Allowed Values: You can enter a valid combination of 1–8 letters (a-z, A-Z), numbers (0–9), and special characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. If a value contains special characters, enclose the value in quotes.

consolidate-im1-images

This **single-valued** attribute specifies whether PSF consolidates a multiple-celled IM1 image into a single IOCA image.

Allowed Values: You can enter one of these fixed values:

yes PSF consolidates a multiple-celled IM1 image into a single IOCA image.

no PSF converts a multiple-celled IM1 image to multiple IOCA images (default).

cse-check-fit

This **single-valued** attribute specifies how PSF checks the pages for cut-sheet emulation (CSE) mode.

Allowed Values: You can enter one of these fixed values:

no PSF does not check to see whether the page fits 2 up on the sheet (default).

first PSF only checks the first page printed for a new code page to see if it fits 2 up on the sheet.

all PSF checks front side of all pages to see if they fit 2 up on the sheet.

cse-orientation

This **single-valued** attribute specifies whether PSF generates portrait or landscape pages for printing in cut-sheet emulation (CSE) mode.

Allowed Values: You can enter one of these fixed values:

portrait PSF generates portrait pages (default).

landscape PSF generates landscape pages.

cse-sheet-eject

This **single-valued** attribute indicates whether PSF starts printing each data set and each copy of a data set on a new sheet of paper when PSF is printing in cut-sheet emulation (CSE) mode.

Allowed Values: You can enter one of these fixed values:

yes   PSF starts printing on a new sheet. PSF also starts printing on a new sheet whenever it performs offset stacking, for example when the form definition requests separation for a new copy group.

no   PSF starts printing on the next sheet or, in N_UP printing, on the next front-side partition. The next front-side partition might occur on the same sheet.

default-process-mode
This **single-valued** attribute specifies the default processing mode PSF uses to print data sets containing both single-byte and double-byte fonts.

Allowed Values: PSF ignores all values but the following fixed values:

SOSI1   Each shift-out, shift-in code is converted to a blank and a Set Coded Font Local text control (default).

SOSI2   Each shift-out, shift-in code is converted to a Set Coded Font Local text control.

SOSI3   The shift-out code is converted to a Set Coded Font Local text control. The shift-in code is converted to a Set Coded Font Local text control and two blanks.

description
This **single-valued** attribute describes the FSA definition. The description can help you select an FSA definition from a list.

Allowed Values: You can enter any combination of 1–256 letters (a-z, A-Z), numbers (0–9), blanks, and special characters (such as # $ @ ! = / -). If the value contains blanks or special characters, enclose the value in quotes.

disconnect-action
This **single-valued** attribute specifies the action that PSF takes when the time specified by the **printer-disconnect-interval** attribute expires and no output is available from JES. This attribute is only for SNA-attached and TCP/IP-attached printers.

Allowed Values: You can enter one of these fixed values:

stop   PSF stops the printer FSA, which can then be restarted only by an operator command.

redrive   PSF redrives the printer FSA according to the value specified by the **printer-management-mode** attribute (default).

dump-code
This **single-valued** attribute specifies a PSF reason code or a restartable abend reason code that causes a conditional dump of the PSF address space when the reason code occurs.

Allowed Values: You can enter an integer from 0 to 2147483647 or a 7–8 character hexadecimal value. A PSF reason code is an 8-character hexadecimal value. An abend reason code is a 7-character hexadecimal value; the first three characters are always **ABD**. When you enter a hexadecimal value (which is suggested), you can enter the hexadecimal characters only or the hexadecimal characters with a prefix of **0x**. For example, enter the dump-code attribute in one of these ways:

```
dump-code=09600c00
dump-code=0x09600c00
dump-code=157289480
```

dump-message-id
This **single-valued** attribute specifies a PSF message that causes a conditional dump of the PSF address space when the message occurs.

Allowed Values: You can enter a value in the format **APS***nnnnt*, where,

nnnn   Three to four digit message number

t   One of these type codes:

        A   Message requiring operator action

        I   Information message

eject-to-front-facing
This **single-valued** attribute specifies whether PSF is to tell your continuous-forms printer to do an eject to front facing before the job-header page, before the start of a new document, or both.

Allowed Values: You can enter one of these fixed values:

none   Eject to front facing is not done (default).

job   Eject to front facing is done before the job-header page.

document   Eject to front facing is done between documents in a data set.

both   Eject to front facing is done before the job-header page and between documents.

end-sna-conversation
This **single-valued** attribute specifies whether PSF ends the SNA LU1 conversation between print jobs while maintaining the SNA session with the printer when the NPRO timer expires or after no job is available for one minute and the last page printed has been stacked.

Allowed Values: You can enter one of these fixed values:

yes   PSF ends the SNA LU1 conversation with the printer.

no   PSF maintains the SNA LU1 conversation between print jobs (default).

error-disposition-supported
This **single-valued** attribute specifies whether PSF honors the error disposition specified with the PRTERROR keyword on the OUTPUT JCL statement when a data set is terminated because an error occurs during printing.

Allowed Values: You can enter one of these fixed values:

yes   PSF honors the specified error disposition.

no   PSF does not honor the specified error disposition (default).

failure-action
This **single-valued** attribute specifies the PSF action after a printer failure, an SNA session failure, or a TCP/IP network failure.

Allowed Values: You can enter one of these fixed values:

stop   PSF must be restarted by an operator command.

connect PSF establishes a connection or waits for the printer (default).

form-definition

This **single-valued** attribute specifies the name of the default form definition that defines how a data set is printed.

Allowed Values: You can enter a valid combination of 1–6 letters (a-z, A-Z), numbers (0–9), and special characters (# $ @). You can enter 7–8 letters, numbers, and special characters if the first two are F1. Blanks and other special characters are not allowed. If a value contains special characters, enclose the value in quotes. Lowercase letters are converted to uppercase.

fsa-trace-dsname

This **single-valued** attribute specifies the data set to which PSF directs an FSA trace when **trace-mode=full**, **trace-mode=ipds**, **trace-mode=limit**, or **trace-mode=sync**.

Allowed Values: You can enter a valid data set name that is allocated before the PSF FSA is started.

fsa-type

This **single-valued** attribute specifies the type of FSA.

Allowed Values: You can enter one of these fixed values:

ip-printway An FSA for remote printers in your TCP/IP network that IP PrintWay transmits data to.

psf-channel An FSA for a channel-attached printer controlled by PSF.

psf-sna An FSA for an SNA-attached printer controlled by PSF.

psf-tcpip An FSA for a TCP/IP-attached printer controlled by PSF.

global-overlay

This **single-valued** attribute specifies the member name of a medium overlay that the printer places on every sheet of output, including separator pages and message pages.

Allowed Values: You can enter a combination of 1–8 letters (a-z, A-Z), numbers (0–9), and special characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. If a value contains special characters, enclose the value in quotes. Lowercase letters are converted to uppercase.

inhibit-recovery

This **single-valued** attribute specifies whether normal PSF error recovery is to be inhibited.

Allowed Values: You can enter one of these fixed values:

yes Normal PSF error recovery is inhibited.

no Normal PSF error recovery is not inhibited (default).

interrupt-message-page

This **single-valued** attribute specifies whether the interrupt message page that PSF inserts in your printed output is printed.

Allowed Values: You can enter one of these fixed values:

print An interrupt message page is printed (default).

suppress An interrupt message page is not printed.

interrupt-message-page-copies
This **single-valued** attribute specifies the number of copies PSF produces of the interrupt message page when the mark-interrupt-message-page attribute is specified.

Allowed Values: You can enter an integer from 1 (default) to 10.

issue-setup-messages
This **single-valued** attribute specifies the setup parameters for which JES should issue a setup message when an SNA-attached or TCP/IP-attached printer is initialized and at the start of any job that specifies a change in a setup parameter from what is active for the printer.

Allowed Values: You can enter one of these fixed values:

none Do not issue a setup message (default).

burst Issue a setup message for the BURST setup parameter.

forms Issue a setup message for the FORMS setup parameter.

all Issue a setup message for both BURST and FORMS setup parameters.

label-data-pages
This **single-valued** attribute specifies whether the security label is printed on each page of printed output. The security label is determined by the SECLABEL parameter of the JOB JCL statement.

Allowed Values: You can enter one of these fixed values:

yes The security label determined by SECLABEL is printed.

no The security label is not printed.

label-separator-pages
This **single-valued** attribute specifies whether the security label is printed on a separator page. The security label is determined by the SECLABEL parameter of the JOB JCL statement.

Allowed Values: You can enter one of these fixed values:

yes The security label determined by SECLABEL is printed.

no The security label is not printed.

logmode
This **single-valued** attribute specifies the name of the VTAM logon-mode table entry, which defines the session parameters for an SNA-attached printer.

Allowed Values: You can enter a valid combination of 1–8 letters (a-z, A-Z), numbers (0–9), and special characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. If a value contains special characters, enclose the value in quotes. Lowercase letters are converted to uppercase.

luname
This **single-valued** attribute specifies the unique, logical-unit name of an SNA-attached printer.

Allowed Values: You can enter a valid combination of 1–8 letters (a-z, A-Z), numbers (0–9), and special characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. If a value contains special characters, enclose the value in quotes. Lowercase letters are converted to uppercase.

map-to-outline-fonts

This **single-valued** attribute specifies whether PSF maps fonts to outline fonts.

Allowed Values: You can enter one of these fixed values:

yes   PSF uses system and user mapping tables to map fonts to corresponding outline fonts.

no   PSF does not map fonts to outline fonts (default).

mark-interrupt-message-page

This **single-valued** attribute specifies whether PSF marks the interrupt message page with form marks.

Allowed Values: You can enter one of these fixed values:

yes   PSF marks the interrupt message page with form marks.

no   PSF does not mark the interrupt message page (default).

message-count-before-dump

This **single-valued** attribute specifies the number of times the message specified by the **dump-message-id** attribute is issued before PSF produces a conditional dump.

Allowed Values: You can enter an integer from 1 (default) to 99.

name

This **single-valued** attribute specifies the name of the FSA for a specific printer.

Note: This is a *non-settable* attribute. Do *not* specify the **name** attribute on the PIDU **create**, **force-create**, or **modify** command; instead, specify the name as an operand on the command. However, you can specify the **name** attribute when you construct a condition for the **where** predicate on the **list** and **export** commands.

Allowed Values: None.

no-response-action

This **single-valued** attribute specifies what action PSF takes when the time specified by the **response-timeout** attribute expires and a response has not been received from the SNA-attached or TCP/IP-attached printer.

Allowed Values: You can enter one of these fixed values:

notify-jes   PSF notifies JES that an expected response was not received from the printer.

notify-user   PSF sends a message to the user ID specified by the **no-response-notify** attribute and to JES indicating that an expected response was not received from the printer.

notify-operator
                   PSF sends a message to the system operator and to JES indicating that an expected response was not received from the printer.

terminate   PSF stops the printer FSA.

no-response-notify

This **single-valued** attribute specifies the user ID to which PSF sends a message when an expected response is not received from the printer before time expires. This attribute is used when **no-response-action=notify-user**.

Allowed Values: Specify the value in the format *node.userid*, where:

node   The node associated with the user ID. Specify from 1–8 alphanumeric or national ($, #, @) characters. Lowercase letters are converted to uppercase.

               The node is required.

userid   The user ID. Specify from 1–8 alphanumeric or national ($, #, @) characters; the first character must be alphabetic or national. Lowercase letters are converted to uppercase.

offset-interrupt-message-page

This **single-valued** attribute specifies whether offset stacking is required for the interrupt message page.

Allowed Values: You can enter one of these fixed values:

yes   The printed output is offset stacked, beginning at the interrupt message page.

no   No offset stacking is done for the interrupt message page (default).

offset-stacking

This **single-valued** attribute controls when PSF performs offset stacking. You can use offset stacking to separate printed output on cut-sheet printers and on continuous-forms printers that support offset stacking.

Allowed Values: You can enter one of these fixed values:

dataset
          PSF performs offset stacking at the start of a new data set or copy of a data set.

job   PSF performs offset stacking at the start of a new job.

none   PSF does not perform offset stacking.

Usage Guidelines:
- This attribute lets you control offset stacking separately from copy marking. If you select a value in this attribute for a printer that supports offset stacking, then the COPYMARK parameter (in the JES initialization statement) and the **suppress-copy-marks** attribute control only copy marking and not offset stacking.
- If you do not specify this attribute, then the COPYMARK parameter and the **suppress-copy-marks** attribute control both copy marking and offset stacking.
- PSF uses the value in this attribute for all jobs unless you override the value in a PSF Exit 7 Begin Data Set (BDS) call.

override-3800-default-font

This **single-valued** attribute specifies whether PSF tells the 3800 to replace the hardware default font with the first font in the current font list.

Allowed Values: You can enter one of these fixed values:

yes PSF lets the printer replace the hardware default font.

no The printer uses the hardware default font (default).

page-definition
This **single-valued** attribute specifies the name of the default page definition that defines how a data set is printed.

Allowed Values: You can enter a valid combination of 1–6 letters (a-z, A-Z), numbers (0–9), and special characters (# $ @). You can enter 7–8 letters, numbers, and special characters if the first two are P1. Blanks and other special characters are not allowed. If a value contains special characters, enclose the value in quotes. Lowercase letters are converted to uppercase.

port-number
This **single-valued** attribute specifies the port number with which PSF is to establish a connection to a TCP/IP-attached printer.

Allowed Values: You can enter an integer from 1 to 65535. The default is 5001.

print-error-messages
This **single-valued** attribute specifies whether PSF should print error messages at the end of a data set.

Allowed Values: You can enter one of these fixed values:

yes Error messages are printed until the value of the **print-error-messages-maximum** attribute is reached; then, processing of the data set stops (default).

no Error messages are not printed. The data set is processed until complete unless a terminating error occurs.

print-error-messages-maximum
This **single-valued** attribute specifies the maximum number of message groups that are printed when **print-error-messages=yes**. When the maximum number is reached, processing of the data set stops.

Allowed Values: You can enter an integer from 0 to 999. The default is 16.

print-error-reporting
This **single-valued** attribute specifies whether the printer reports character and position errors to PSF.

Allowed Values: You can enter one of these fixed values:

none Do not report any character or position errors to PSF (default).

all Report all character and position errors to PSF.

character Report only character errors to PSF.

position Report only position errors to PSF.

printer-acquire-interval
This **single-valued** attribute specifies the number of seconds between the time PSF releases a printer and when PSF tries to acquire it again. This attribute is only used when **printer-release-mode=time**.

Allowed Values: You can enter an integer from 0 (default) to 86400.

printer-connect-interval

This **single-valued** attribute specifies the number of seconds during which PSF attempts to start a session or a dialog with a printer.

Allowed Values: You can enter an integer from 0 to 86400.

printer-disconnect-interval

This **single-valued** attribute specifies the number of seconds until PSF ends the session with an SNA-attached or TCP/IP-attached printer.

Allowed Values: You can enter an integer from 0 (default) to 86400.

printer-ip-address

This **single-valued** attribute specifies the Internet Protocol (IP) address or host name of the TCP/IP-attached printer.

Allowed Values: You can specify the IP address in dotted-decimal format (nnnn.nnnn.nnnn.nnnn) or specify the host name. Specify a valid combination of 1–40 letters (a-z, A-Z), numbers (0–9), and special characters (such as # $ @ — = /). Blanks are not allowed. If the value contains special characters, enclose the value in quotes.

printer-management-mode

This **single-valued** attribute specifies how PSF controls an SNA-attached or TCP/IP-attached printer in deferred-printing mode.

Allowed Values: You can enter one of these fixed values:

immediate   PSF starts a communication session with the printer immediately and then looks for output available on the JES spool.

dialin   PSF starts a session with the printer when the switched line is connected.

outavail   PSF starts a communication session with the printer only when output is available on the JES spool (default).

printer-release-interval

This **single-valued** attribute specifies the number of seconds after which PSF responds to a request to release a printer in the method specified by the **printer-release-mode** attribute.

Allowed Values: You can enter an integer from 0 (default) to 86400.

printer-release-mode

This **single-valued** attribute specifies how PSF is to respond to a request to release the printer.

Allowed Values: You can enter one of these fixed values:

idle   PSF releases the printer when a request to release has been received and the time specified by the **printer-release-interval** attribute has expired with no output on the spool for the printer.

time   PSF starts the timer for the release interval when a release request is received, even when there is more output on the spool.

none   PSF does not release the printer (default).

prune-double-byte-fonts
This **single-valued** attribute specifies whether PSF prunes double-byte raster fonts to reduce the amount of font data sent to the printer.

Allowed Values: You can enter one of these fixed values:

yes   PSF prunes double-byte raster fonts (default).

no   PSF does not prune double-byte fonts.

prune-single-byte-fonts
This **single-valued** attribute specifies whether PSF prunes single-byte raster fonts to reduce the amount of font data sent to the printer.

Allowed Values: You can enter one of these fixed values:

yes   PSF prunes single-byte raster fonts (default).

no   PSF does not prune single-byte fonts.

psf-send-default-character
This **single-valued** attribute specifies whether PSF passes the default character information to the printer by fully populating the outline single-byte code page.

Allowed Values: You can enter one of these fixed values:

yes   PSF passes the default character information to the printer.

no   PSF does not pass the default character information to the printer (default).

recover-from-font-not-found
This **single-valued** attribute specifies whether PSF should make sure the outline font derived from the mapped font exists before proceeding.

Allowed Values: You can enter one of these fixed values:

yes   PSF should perform library queries to make sure the mapped font exists before loading it.

no   PSF does not need to make sure that the mapped font exists (default).

release-ds-when-repositioning
This **single-valued** attribute specifies whether PSF should release data sets when repositioning beyond them, such as during a paper jam or a page adjust.

Allowed Values: You can enter one of these fixed values:

yes   Data sets are released when PSF repositions beyond them.

no   Data sets are retained during repositioning (default).

resolution
This **single-valued** attribute specifies the resolution at which the output was formatted.

Allowed Values: You can enter one of these fixed values:

240   The data was formatted with resources at 240 pels per inch.

300   The data was formatted with resources at 300 pels per inch.

response-timeout
This **single-valued** attribute specifies maximum number of seconds PSF should wait for a response from an SNA-attached or TCP/IP-attached printer.

Allowed Values: You can enter an integer from 0 (default) to 86400.

restrict-printable-area

This **single-valued** attribute specifies whether an area on each page of printed output is reserved for the security label.

Allowed Values: You can enter one of these fixed values:

yes   An area on each page is reserved for the security label.

no   An area is not reserved for the security label.

retained-fonts

This **single-valued** attribute specifies the maximum number of fonts that PSF retains in printer storage between print jobs.

Allowed Values: You can enter a value from 0 to 32767. The default value depends on the type of printer and the amount of storage available in the printer.

Usage Guidelines:

- When PSF retains fonts, PSF does not need to reload the same fonts for subsequent jobs. However, retaining fonts requires additional printer storage.
- This value overrides the reasonable resource loading value (RRLV) for fonts that you can specify in the PSF Exit 7 initialization call.
- Refer to *PSF for OS/390 & z/OS: Customization* for information about RRLVs and also to see if your release of PSF supports this attribute.

retained-form-definitions

This **single-valued** attribute specifies the maximum number of form definitions that PSF retains in virtual storage between print jobs.

Allowed Values: You can enter a value from 0 to 32767. The default value is 6.

Usage Guidelines:

- When PSF retains form definitions, PSF does not need to reload the same form definitions for subsequent jobs. However, retaining form definitions requires additional virtual storage.
- This value overrides the reasonable resource loading value (RRLV) for form definitions that you can specify in the PSF Exit 7 initialization call.
- Refer to *PSF for OS/390 & z/OS: Customization* for information about RRLVs and also to see if your release of PSF supports this attribute.

retained-object-containers

This **single-valued** attribute specifies the maximum number of object containers that PSF retains in printer storage between print jobs.

Allowed Values: You can enter a value from 0 to 32767. The default value is 0.

Usage Guidelines:

- PSF does not currently retain object containers; therefore, PSF ignores a value greater than 0.
- This value overrides the reasonable resource loading value (RRLV) for object containers that you can specify in the PSF Exit 7 initialization call.
- Refer to *PSF for OS/390 & z/OS: Customization* for information about RRLVs and also to see if your release of PSF supports this attribute.

retained-page-definitions

This **single-valued** attribute specifies the maximum number of page definitions that PSF retains in virtual storage between print jobs.

Allowed Values: You can enter a value from 0 to 32767. The default value is 6.

Usage Guidelines:

- When PSF retains page definitions, PSF does not need to reload the same page definitions for subsequent jobs. However, retaining page definitions requires additional virtual storage.
- This value overrides the reasonable resource loading value (RRLV) for page definitions that you can specify in the PSF Exit 7 initialization call.
- Refer to *PSF for OS/390 & z/OS: Customization* for information about RRLVs and also to see if your release of PSF supports this attribute.

retained-page-segments

This **single-valued** attribute specifies the maximum number of page segments that PSF retains in printer storage between print jobs.

Allowed Values: You can enter a value from 0 to 32767. The default value is 0.

Usage Guidelines:

- When PSF retains page segments, PSF does not need to reload the same page segments for subsequent jobs. However, retaining page segments requires additional printer storage.
- This value overrides the reasonable resource loading value (RRLV) for page segments that you can specify in the PSF Exit 7 initialization call.
- Refer to *PSF for OS/390 & z/OS: Customization* for information about RRLVs and also to see if your release of PSF supports this attribute.

save-printer-information

This **single-valued** attribute requests that PSF save information about the printer, including the printer's model and supported features. PSF saves the information in a data set specified in the PSF startup procedure each time the printer is started and each time the printer's configuration changes. This information can help IBM diagnose problems.

Allowed Values: You can enter one of these fixed values:

yes   PSF saves printer information.

no   PSF does not save printer information (default).

Usage Guidelines: This attribute is equivalent to the PRTINFO keyword of the PRINTDEV statement. Refer to *PSF for OS/390 & z/OS: Customization* to see if your release of PSF supports the PRTINFO keyword and this attribute.

send-messages-to-sysout

This **single-valued** attribute specifies whether PSF redirects a message data set as a SYSOUT data set to another CLASS or DEST for viewing or printing.

Allowed Values: You can enter one of these fixed values:

yes   PSF sends the message data set to a SYSOUT data set.

no   PSF does not send the message data set to a SYSOUT data set.

set-3800-dataset-header-origin

This **single-valued** attribute specifies whether PSF sets the data set header media origin on continuous-forms printers to the top left corner.

Allowed Values: You can enter one of these fixed values:

yes PSF sets the data set header media origin to the top left corner.

no PSF does not set the data set header media origin to the top left corner (default).

set-3800-dataset-origin

This **single-valued** attribute specifies whether PSF sets the data set media origin on continuous-forms printers to the top left corner.

Allowed Values: You can enter one of these fixed values:

yes PSF sets the data set media origin to the top left corner.

no PSF does not set the data set media origin to the top left corner (default).

set-3800-job-header-origin

This **single-valued** attribute specifies whether PSF sets the job header media origin on continuous-forms printers to the top left corner.

Allowed Values: You can enter one of these fixed values:

yes PSF sets the job header media origin to the top left corner.

no PSF does not set the job header media origin to the top left corner (default).

set-3800-job-trailer-origin

This **single-valued** attribute specifies whether PSF sets the job trailer media origin on continuous-forms printers to the top left corner.

Allowed Values: You can enter one of these fixed values:

yes PSF sets the job trailer media origin to the top left corner.

no PSF does not set the job trailer media origin to the top left corner (default).

set-3800-messages-origin

This **single-valued** attribute specifies whether PSF sets the message data set media origin on continuous-forms printers to the top left corner.

Allowed Values: You can enter one of these fixed values:

yes PSF sets the message data set media origin to the top left corner.

no PSF does not set the message data set media origin to the top left corner (default).

snmp-reporting

This **single-valued** attribute specifies whether PSF supplies printer status information to the z/OS Simple Network Management Protocol (SNMP) agent.

Allowed Values: You can enter one of these fixed values:

yes SNMP reporting is done.

no SNMP reporting is not done (default).

suppress-copy-marks

This **single-valued** attribute specifies whether PSF should not print copy marks or perform offset stacking. This field overrides the COPYMARK parameter of the JES initialization statement for the printer.

Allowed Values: You can enter one of these fixed values:

yes   Copy marks are not printed and offset stacking is not performed.

no   Copy marks are printed and offset stacking is performed if requested in the COPYMARK parameter (default).

Usage Guidelines: If you specify **suppress-copy-marks=yes** and also specify any value in the **offset-stacking** attribute, then PSF suppresses only the printing of copy marks, while the **offset-stacking** attribute controls when PSF performs offset stacking.

trace-mode

This **single-valued** attribute specifies the type of PSF or IP PrintWay tracing that is started during FSA initialization. If the FSA has already started, a new trace mode takes effect the next time the FSA starts.

Allowed Values: You can enter one of these fixed values:

none   **PSF**: No tracing is started during PSF initialization.

                 IP PrintWay: The tracing mode in the IP PrintWay FSS definition is used for the FSA (default).

internal   **PSF**: An internal trace is started (default).

                 IP PrintWay: Only internal tracing is started.

ipds   **PSF**: An external trace containing only IPDS data is started. An internal trace is also started.

                 IP PrintWay: IP PrintWay ignores this value.

limit   **PSF**: An external trace like the full trace is started; however, information in some data buffers is truncated. An internal trace is also started.

                 IP PrintWay: IP PrintWay ignores this value.

sync   **PSF**: An FSA SYNC external trace is started. An internal trace is also started.

                 IP PrintWay: IP PrintWay ignores this value.

no-printing   **IP PrintWay**: Internal and external tracing is started, without tracing of record processing. Input records and TCP/IP commands are not traced.

                 PSF: PSF ignores this value and starts only an internal trace.

full   **PSF** and **IP PrintWay**: An FSA full external trace is started. An internal trace is also started.

Usage Guidelines for IP PrintWay Only:

- If you specify **full** or **no-printing**, you must start a GTF trace before starting the FSA.
- You can use the MODIFY operator command to stop the trace or to start tracing after an FSA has started.

fsa

- You might not want to start a full trace during peak processor usage.

trace-table-size

This **single-valued** attribute specifies a number that indicates how many 4 KB pages of storage are allocated for the FSA trace table.

Allowed Values: You can enter an integer from 1 to 999. The default is 32.

Attributes for NetSpool EOF Rules Object Class

This section lists two of the attributes that are valid when you create NetSpool End-of-File components, which are in object class **netspool-eof-rules**. These attributes are also valid for the **printer** object class.

Due to the complexity of the other attributes that are valid for the **netspool-eof-rules** object class, these attributes are not described here. IBM recommends that you use the Infoprint Server ISPF panels to specify end-of-file rules.

Required Attributes

All attributes are optional.

description

This **single-valued** attribute lets you provide a description for the component. The description can help you select the correct component from a list.

Allowed Values: Any combination of 1-256 letters (a-z, A-Z), numbers (0-9), blanks, and special characters (such as # $ @ ! = / -). If the value contains blanks or special characters, enclose it in single or double quotes.

Default Value: None.

name

This **single-valued** attribute specifies the name of the component.

Note: This is a *non-settable* attribute. Do *not* specify **name** on the PIDU **create**, **force-create**, or **modify** command; instead, specify the name as an operand on the command. However, you can specify this attribute when you construct a condition for the **where** predicate on the **list** and **export** commands.

Allowed Values: Any combination of 1-17 letters (a-z, A-Z), numbers (0-9), and special characters (such as $ # @ . - = /). Blank characters are not allowed.

Default Value: None.

Attributes for NetSpool Options Object Class

This section lists attributes that are valid when you create NetSpool Options components, which are in object class **netspool-options**. These attributes are also valid for the **printer** object class.

Required Attributes

All attributes are optional.

description

This **single-valued** attribute lets you provide a description for the component. The description can help you select the correct component from a list.

Allowed Values: Any combination of 1-256 letters (a-z, A-Z), numbers (0-9), blanks, and special characters (such as # $ @ ! = / -). If the value contains blanks or special characters, enclose it in single or double quotes.

Default Value: None.

maximum-record-size

This **single-valued** attribute specifies the maximum record size for the variable-length records that NetSpool writes to the output data set when **netspool-formatting=none**.

Allowed Values: An integer from 1 to 32752.

Default Value: NetSpool uses 32752 as the maximum record size.

Usage Guidelines:

- If the length of the data in the input Request Unit (RU) is less than this value, NetSpool writes one record.
- If the length of the data in the input RU is greater than this value, NetSpool writes multiple records.
- If **netspool-formatting=convert-to-line** (default) or **netspool-formatting=convert-to-pcl**, do not specify this attribute.

name

This **single-valued** attribute contains the name of the component.

Note: This is a *non-settable* attribute. Do *not* specify the **name** attribute on the PIDU **create**, **force-create**, or **modify** command; instead, specify the name as an operand on the command. However, you can specify the **name** attribute when you construct a condition for the **where** predicate on the **list** and **export** commands.

Allowed Values: Any combination of 1-17 letters (a-z, A-Z), numbers (0-9), and special characters (such as $ # @ . - = /). Blank characters are not allowed.

Default Value: None.

netspool-formatting

This **single-valued** attribute specifies the type of formatting that NetSpool performs before writing the input data to an output data set on the JES spool.

Allowed Values: You can enter one of these fixed values:

none   NetSpool writes the input data without change to the output data set. NetSpool uses values specified in the following attributes:
  - **maximum-record-size**
  - **recfm**

          NetSpool does not call any exits.

convert-to-line
          NetSpool converts SNA character stream (SCS) and 3270 data streams into line data streams. Optionally, specify the following attributes in the **processing** object class, which NetSpool uses during conversion:
  - **scs-bottom-margin**
  - **scs-horizontal-tabs**
  - **scs-left-margin**

- **scs-maximum-line-length**
- **scs-maximum-page-length**
- **scs-right-margin**
- **scs-top-margin**
- **scs-vertical-tabs**

Synonym: standard

convert-to-pcl

NetSpool converts SNA character stream (SCS) and 3270 data streams into PCL data streams. Optionally, specify the following attributes in the **processing** object class, which NetSpool uses during conversion:

- **pcl-line-density**
- **pcl-orientation**
- **pcl-print-density**
- **scs-automatic-page-orientation**
- **scs-bottom-margin**
- **scs-horizontal-tabs**
- **scs-left-margin**
- **scs-maximum-line-length**
- **scs-maximum-page-length**
- **scs-right-margin**
- **scs-top-margin**
- **scs-vertical-tabs**

Default Value: **convert-to-line**

Usage Guidelines: If you specify **netspool-formatting=none**, do not specify the **busy-interval** or **idle-interval** attributes.

recfm

This **single-valued** attribute specifies the record format (RECFM) for the output data sets that NetSpool writes to the JES spool when **netspool-formatting=none**.

Allowed Values: You can enter one of these fixed values:

vb   Variable length, blocked records

vba   Variable length, blocked records, with ANSI carriage control characters

vbm   Variable length, blocked records, with machine carriage control characters

Default Value: NetSpool writes variable length, blocked records.

Usage Guidelines: If **netspool-formatting=convert-to-line** (default) or **netspool-formatting=convert-to-pcl**, do not specify this attribute. NetSpool ignores it if specified.

Attributes for Printer Object Class

This section lists the attributes that are valid when you create printer definitions, which are in object class **printer**. In addition to these attributes, you can also specify attributes that are valid for the object classes listed in Table 27 on page 311. Some object classes listed in the table are valid only for certain printer types, as defined by the **printer-type** attribute.

Table 27. Object Classes Whose Attributes are Valid for Printer Object Class

Object Class	Valid for Printer Type:	See Page:
allocation	All types	271
netspool-eof-rules	All types	308
netspool-options	All types	308
printway-options	**general, ip-printway**	321
processing	All types	331
protocol	**ip-printway**	345

Required Attributes

In order for Infoprint Server to display the correct ISPF panels for a printer definition, you must specify the **printer-type** attribute.

NetSpool requires the **luname** attribute.

Also, see the list of attributes for the other object classes whose attributes are valid for the printer object class. Table 27 summarizes these object classes. These object classes identify other required attributes.

dcf-routing

This **single-valued** attribute specifies whether job submitters can use the DEST, CLASS, and FORMS JCL parameters to select this printer definition. See "Using DEST, CLASS, and FORMS to Select a Printer Definition" on page 167 for more information.

Allowed Values: You can enter one of these fixed values:

yes   The DEST, CLASS, and FORMS parameters can be used to select this printer definition.

no   The DEST, CLASS, and FORMS *cannot* be used to select this printer definition.

Default Value: IP PrintWay does not let job submitters select this printer using the DEST, CLASS, and FORMS parameters.

Usage Guidelines:
*   This attribute applies only for IP PrintWay printer definitions (**printer-type** =**ip-printway**).
*   If you select **yes**, you must also specify a value for one or more of these attributes: **output-class**, **destination**, or **forms**. If you omit one of these attributes, IP PrintWay does not use the corresponding JCL parameter for printer selection. The values for the **output-class**, **destination**, and **forms** attributes must, together, be unique in all printer definitions with **dcf-routing** = **yes**.
*   Set this attribute to **yes** if you are migrating IP PrintWay routing entries and want to continue to use DEST, CLASS, and FORMS as selection criteria.
*   Regardless of the value of this attribute, a job submitter can specify a printer name on an OUTPUT JCL statement to select this printer definition (in the FSSDATA parameter).

description

This **single-valued** attribute lets you provide a description for the printer definition. The description can help users select a printer definition.

printer

Allowed Values: Any combination of 1-256 letters (a-z, A-Z), numbers (0-9), blanks, and special characters (such as # $ @ ! = / -). If the value contains blanks or special characters, enclose it in single or double quotes.

Default Value: None.

general-spooling-mode
This **single-valued** attribute indicates how Print Interface writes the input data to the output data set on the JES spool when **printer-type=general**. Select a value that is suitable for the printer. **spooling-mode** is an alias for this attribute.

Allowed Values: You can enter one of these fixed values:

line   Print Interface writes the data in records. This value is suitable for JES and IBM AFP printers.

stream   Print Interface writes the data as a data stream, with control characters to indicate the end of lines. This value is suitable for ASCII printers.

Default Value: **line**

Usage Guidelines: This attribute applies only for General printer definitions (**printer-type**=**general**). It is ignored if **printer-type=psf-mvs** or **printer-type=ip-printway.**

include-allocation
This **single-valued** attribute specifies the name of the Allocation component to be included in this printer definition. An Allocation component is an object in object-class **allocation**.

Allowed Values: Any combination of 1-17 letters (a-z, A-Z), numbers (0-9), and special characters (such as $ # @ . - = /). Blanks are not allowed. If the value contains special characters, enclose it in single or double quotes.

Default Value: No Allocation component is included in the printer definition.

Usage Guidelines: All attributes specified in this component apply to the printer definition. To override an attribute from the component, specify the attribute on the **create** or **modify** command for the printer definition.

include-netspool-eof-rules
This **single-valued** attribute specifies the name of a NetSpool End-of-File component to be included in this printer definition. A NetSpool End-of-File component is an object in object-class **netspool-eof-rules**.

Allowed Values: Any combination of 1-17 letters (a-z, A-Z), numbers (0-9), and special characters (such as $ # @ . - = /). Blanks are not allowed. If the value contains special characters, enclose it in single or double quotes.

Default Value: No NetSpool End-of-File component is included in the printer definition.

Usage Guidelines: All attributes specified in this component apply to the printer definition. To override an attribute from the component, specify the attribute on the **create** or **modify** command for the printer definition.

include-netspool-options

This **single-valued** attribute specifies the name of a NetSpool Options component to be included in this printer definition. A NetSpool Options component is an object in object-class **netspool-options**.

Allowed Values: Any combination of 1-17 letters (a-z, A-Z), numbers (0-9), and special characters (such as $ # @ . - = /). Blanks are not allowed. If the value contains special characters, enclose it in single or double quotes.

Default Value: No NetSpool Options component is included in the printer definition.

Usage Guidelines: All attributes specified in this component apply to the printer definition. To override an attribute from the component, specify the attribute on the **create** or **modify** command for the printer definition.

include-printway-options

This **single-valued** attribute specifies the name of an IP PrintWay Options component to be included in this printer definition. An IP PrintWay Options component is an object in object-class **printway-options**.

Allowed Values: Any combination of 1-17 letters (a-z, A-Z), numbers (0-9), and special characters (such as $ # @ . - = /). Blanks are not allowed. If the value contains special characters, enclose it in single or double quotes.

Default Value: No IP PrintWay Options component is included in the printer definition.

Usage Guidelines:
- All attributes specified in this component apply to the printer definition. To override an attribute from the component, specify the attribute on the **create** or **modify** command for the printer definition.
- This attribute applies only to IP PrintWay and General printer definitions (**printer-type=ip-printway** and **printer-type=general**).

include-processing

This **single-valued** attribute specifies the name of a Processing component to be included in this printer definition. A Processing component is an object in object-class **processing**.

Allowed Values: Any combination of 1-17 letters (a-z, A-Z), numbers (0-9), and special characters (such as $ # @ . - = /). Blanks are not allowed. If the value contains special characters, enclose it in single or double quotes.

Default Value: No Processing component is included in the printer definition.

Usage Guidelines: All attributes specified in this component apply to the printer definition. To override an attribute from the component, specify the attribute on the **create** or **modify** command for the printer definition.

include-protocol

This **single-valued** attribute specifies the name of a Protocol component to be included in this printer definition. A Protocol component is an object in object-class **protocol**.

printer

> ***Allowed Values:*** Any combination of 1-17 letters (a-z, A-Z), numbers (0-9), and special characters (such as $ # @ . - = /). Blanks are not allowed. If the value contains special characters, enclose it in single or double quotes.
>
> ***Default Value:*** No Protocol component is included in the printer definition.
>
> ***Usage Guidelines:***
> - All attributes specified in this component apply to the printer definition. To override an attribute from the component, specify the attribute on the **create** or **modify** command for the printer definition.
> - This attribute applies only to IP PrintWay printer definitions (**printer-type=ip-printway**).

location

This **single-valued** attribute lets you specify the location of the printer. The location can help users select a printer definition.

Allowed Values: Any combination of 1-256 letters (a-z, A-Z), numbers (0-9), blanks, and special characters (such as # $ @ ! = / -).

Default Value: None.

Usage Guidelines: If you use the same format to specify the location in all printer definitions (for example: Bldg 3/Col 2), you can selectively list all printer definitions with similar locations, such as all printers in Bldg 3.

lu-classes

This **multi-valued**, **list** attribute identifies from one to sixty-four logical-unit (LU) classes for this NetSpool LU. If you specify more than one class, the NetSpool LU is assigned to all of the specified classes.

Allowed Values: An integer from 1 to 64. You can specify a list of up to 64 classes. If you specify more than one LU class, separate the LU classes by spaces and surround the list of LU classes with braces, for example:

```
lu-classes={1 4 64}
```

Default Value: {1}

Usage Guidelines: When NetSpool starts, it starts LUs according to LU class; therefore, specify the same LU class for all NetSpool LUs that you want to start at the same time.

luname

This **single-valued** attribute specifies the logical unit (LU) name that NetSpool uses to identify this printer. This name must be a unique LU name in the Printer Inventory.

Allowed Values: A combination of 1-8 letters (a-z, A-Z), numbers (0-9), and special characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. If the value contains special characters, enclose it in single or double quotes. Lowercase letters are converted to uppercase.

Default Value: None.

Usage Guidelines:
- This attribute is required for NetSpool to start a session with this printer.

- The name must match the LU name specified in the ACBNAME field of the VTAM APPL definition statement.

name
This **single-valued** attribute specifies the name of the printer definition.

Note: This is a *non-settable* attribute. Do *not* specify the **name** attribute on the PIDU **create**, **force-create**, or **modify** command; instead, specify the name as an operand on the command. However, you can specify the **name** attribute when you construct a condition for the **where** predicate on the **list** and **export** commands.

Allowed Values: Any combination of 1-17 letters (a-z, A-Z), numbers (0-9), and special characters (such as $ # @ . - = /). Blank characters are not allowed.

Default Value: None.

printer-type
This **single-valued** attribute specifies the type of printer definition.

Allowed Values: You can enter one of these fixed values:

general   A printer definition for printers that are neither IP PrintWay nor PSF for OS/390 types.

ip-printway   A printer definition for remote printers in your TCP/IP or SNA network to which IP PrintWay transmits data.

psf-mvs   A printer definition for AFP printers controlled by PSF for OS/390.

Default Value: The Infoprint Server ISPF panels display the printer definition as a General printer definition. Print Interface writes data to the output data set on the JES spool in records (**general-spooling-mode=line**).

Attributes for Printer-Pool Object Class

This section lists attributes that are valid when you create printer pool definitions, which are in object class **printer-pool**.

Required Attributes
NetSpool requires the following attributes:
- **lu-classes**
- **luname**
- **printer-names**

All other attributes are optional.

description
This **single-valued** attribute lets you provide a description for the printer definition. The description can help users select a printer definition.

Allowed Values: Any combination of 1-256 letters (a-z, A-Z), numbers (0-9), blanks, and special characters (such as # $ @ ! = / -). If the value contains blanks or special characters, enclose it in single or double quotes.

Default Value: None.

include-netspool-eof-rules

This **single-valued** attribute specifies the name of a NetSpool End-of-File component to be included in this printer pool definition. A NetSpool End-of-File component is an object in object-class **netspool-eof-rules**.

Allowed Values: Any combination of 1-17 letters (a-z, A-Z), numbers (0-9), and special characters (such as $ # @ . - = /). Blanks are not allowed. If the value contains special characters, enclose it in single or double quotes. Be sure to specify the correct uppercase and lowercase letters.

Default Value: No NetSpool End-of-File component is included in the printer definition.

Usage Guidelines: All attributes specified in this component apply to the printer pool definition.

lu-classes

This **multi-valued**, **list** attribute identifies from one to sixty-four logical-unit (LU) classes for this NetSpool LU. If you specify more than one class, the NetSpool LU is assigned to all of the specified classes.

Allowed Values: A number from 1 to 64. You can specify a list of up to 64 classes. If you specify more than one LU class, separate the LU classes with spaces and enclose the list in braces, for example:

```
lu-classes={1 4 64}
```

Default Value: None.

Usage Guidelines:

- NetSpool requires this attribute.
- When NetSpool starts, it starts LUs according to LU class; therefore, specify the same LU class for all NetSpool LUs that you want to start at the same time.

luname

This **single-valued** attribute specifies the logical unit (LU) name that NetSpool uses to identify this printer pool definition. This name must be a unique LU name in the Printer Inventory.

Allowed Values: A combination of 1-8 letters (a-z, A-Z), numbers (0-9), and special characters (# $ @). The first character cannot be numeric; blanks and other special characters are not allowed. If the value contains special characters, enclose it in single or double quotes. Lowercase letters are converted to uppercase.

Default Value: None.

Usage Guidelines:

- NetSpool requires this attribute to start a session with this printer.
- This name must match the LU name specified in the ACBNAME field of the VTAM APPL definition statement.

name

This **single-valued** attribute specifies the name of the printer pool definition.

Note: This is a *non-settable* attribute. Do *not* specify the **name** attribute on the PIDU **create**, **force-create**, or **modify** command; instead, specify the name

as an operand on the command. However, you can specify the **name** attribute when you construct a condition for the **where** predicate on the **list** and **export** commands.

Allowed Values: Any combination of 1-17 letters (a-z, A-Z), numbers (0-9), and special characters (such as $ # @ . - = /). Blank characters are not allowed.

Default Value: None.

printer-names

This **multi-valued, list** attribute specifies the names of one or more printer definitions. The printer definitions must exist in the Printer Inventory. NetSpool creates an output data set on the JES spool for each printer definition.

Allowed Values: A list of one or more printer definition names. Separate the names with spaces and enclose the list of names with braces, for example:

```
printer-names={name1 name2 name3}
```

Default Value: None.

Usage Guidelines:

- NetSpool requires this attribute.
- NetSpool uses the following attributes defined for the first printer definition in the list; NetSpool ignores these attributes defined in subsequent printer definitions:
  - **netspool-formatting**, **maximum-record-size**, **recfm**
  - **scs-left-margin**, **scs-right-margin**, **scs-top-margin**, **scs-bottom-margin**
  - **scs-maximum-line-length**, **scs-maximum-page-length**
  - **horizontal-tab**, **vertical-tab**

Attributes for PrintWay FSS Object Class

This section lists attributes that are valid when you create IP PrintWay FSS definitions, which are in object class **printway-fss**.

Required Attributes

All attributes are optional.

applid

This **single-valued** attribute specifies the application program ID that IP PrintWay uses to establish a VTAM session with a printer. This ID must match the name of an APPL statement defined to VTAM. This field is required if the VTAM protocol type is selected in any printer definition used by this IP PrintWay FSA.

Allowed Values: A valid combination of 1-8 letters, numbers, and national characters (# $ @). The first character cannot be numeric. Lowercase characters are converted to uppercase.

Default Value: None.

Usage Guidelines: You must install the Coax Printer Support feature of Infoprint Server Transforms and define the APPL statement to VTAM before you specify this attribute and restart the IP PrintWay FSS; otherwise, IP PrintWay abends.

printway-fss

default-document-codepage

This **single-valued** attribute specifies the name of a default EBCDIC code page to use as the source code page when IP PrintWay translates data from EBCDIC to ASCII.

Allowed Values: A valid code page name. An example of a valid code page is:

```
default-document-codepage = IBM-037
```

Default Value: IP PrintWay uses code page IBM-1047.

Usage Guidelines:

- If the printer definition used to print the job contains a code page in the **document-code-page** attribute, that code page overrides this value.
- For code page names, refer to *z/OS C/C++ Programming Guide*.
- If you change this value, you must restart the FSS to pick up the new value.

description

This **single-valued** attribute lets you provide a description for the FSA definition. The description can help you select the FSA definition from a list.

Allowed Values: Any combination of 1-256 letters (a-z, A-Z), numbers (0-9), blanks, and special characters (such as # $ @ ! = / -). If the value contains blanks or special characters, enclose it in single or double quotes.

Default Value: None.

maximum-hiperspace-blocks

This **single-valued** attribute specifies the maximum number of 4 KB blocks that each functional subsystem application (FSA) in this FSS can use in hiperspace. The number you specify can affect system performance and also can limit the size of the data sets the FSA can process.

Allowed Values: An integer from 1 - 524288.

Default Value: Each IP PrintWay FSA uses 8,000 4 KB blocks, which is 32 megabytes.

Usage Guidelines:

- If a data set requires a larger amount of hiperspace, IP PrintWay records an error and retains the data set on the JES spool if a retention period is specified for failed transmissions in the **failure-retention-period** attribute for the printer definition used to process the data set.
- If you change this value, you must restart the FSS to pick up the new value.

name

This **single-valued** attribute specifies the name of the FSA definition.

Note: This is a *non-settable* attribute. Do *not* specify the **name** attribute on the PIDU **create**, **force-create**, or **modify** command; instead, specify the name as an operand on the command. However, you can specify the **name** attribute when you construct a condition for the **where** predicate on the **list** and **export** commands.

Allowed Values: Any combination of 1-8 letters (A-Z), numbers (0-9), and national characters ($ # @). Blank characters are not allowed. The first character cannot be a number. Lowercase letters are converted to uppercase.

Default Value: None.

national-language
This **single-valued** attribute specifies the language that IP PrintWay uses for messages.

Allowed Values: You can enter one of these fixed values:

us-english IP PrintWay uses English message table ANFMTENU.

ja-japanese IP PrintWay uses Japanese message table ANFMTJPN.

Default Value: Each IP PrintWay FSA uses English messages.

Usage Guidelines: If you change this value, you must restart the FSS to pick up the new value.

old-style-translation
This **single-valued** attribute indicates whether IP PrintWay uses the standard TCP/IP translate table to convert data from EBCDIC to ASCII when no code pages or TCP/IP translation tables are specified in the printer definition. See "Usage Guidelines" for more information.

Allowed Values: You can enter one of these fixed values:

yes IP PrintWay uses the standard TCP/IP translate table, STANDARD.TCPXLBIN, to convert data if no code pages and translation tables are specified in the printer definition.

no IP PrintWay takes the default action. See "Default Value".

Default Value: IP PrintWay uses code pages and the **iconv** conversion utility to convert data. The source code page is specified in the **default-document-codepage** attribute; the target code page is IBM-850.

Usage Guidelines:
- IP PrintWay ignores this attribute under either of the following conditions:
  - The printer definition specifies a code page in either the **document-codepage** or **printer-codepage** attribute; in this case IP PrintWay uses the **iconv** conversion utility and the specified code pages to convert data.
  - The printer definition specifies a TCP/IP translation table in the **translation-dataset-qualifier** or **db-translate-table** attributes; in this case, IP PrintWay uses the specified translate table instead.
- If you change this value, you must restart the FSS to pick up the new value.

tcpip-job-name
This **single-valued** attribute specifies the name of the TCP/IP startup procedure. If you have changed the name of the TCP/IP startup procedure, specify the new name in this attribute.

Allowed Values: A valid job name. Lowercase letters are converted to uppercase.

Default Value: If you do not specify this attribute, the IP PrintWay FSA uses the name specified in TCPIPJOBNAME statement in the *tcphlq*.TCPIP.DATA data set. If the TCPIPJOBNAME statement is not specified, IP PrintWay uses TCPIP as the name of the TCP/IP startup procedure. For more information, refer to *z/OS Infoprint Server Customization*.

printway-fss

Usage Guidelines: If you change this value, you must restart the FSS to pick up the new value.

trace-mode

This **single-valued** attribute specifies the type of IP PrintWay tracing for the FSS, and the default tracing mode for all functional subsystem applications (FSAs) within the FSS. Tracing starts when the FSS and FSAs starts. The trace mode specified in each FSA definition overrides this tracing mode for that FSA.

Allowed Values: You can enter one of these fixed values:

full　　　　Full internal and external tracing.

internal　　Internal tracing only.

no-printing　Internal and external tracing, without tracing of record processing; that is, IP PrintWay does not trace input records and TCP/IP commands.

none　　　　No tracing

Default Value: No tracing.

Usage Guidelines:

- The **internal** trace mode can assist IBM in diagnosing problems. IBM recommends that you specify this tracing mode.
- If you specify **full** or **no-printing**, you must start a GTF trace before starting the FSS.
- You can use the MODIFY operator command to stop the trace or to start tracing after an FSS or FSA is started.
- Do not start a full trace during peak processor usage.
- You must restart the FSS to pick up a changed value.

trace-prompt

This **single-valued** attribute indicates whether the operator is prompted each time the FSS starts. If this option is selected, IP PrintWay issues message ANFM020A to the operator when the FSS starts. Prompting lets the operator start tracing all functional susbsytem applications (FSAs) before the FSA starts processing any data sets.

Allowed Values: You can enter one of these fixed values:

yes　　The operator is prompted when the FSS starts.

no　　The operator is not prompted.

Default Value: The operator is not prompted.

Usage Guidelines: If you change this value, you must restart the FSS to pick up the new value.

trace-table-size

This **single-valued** attribute specifies the number of 4 KB pages of storage to allocate for each internal functional subsystem application (FSA) trace table. The storage for the trace tables is allocated above the 16 MB line.

Allowed Values: An integer from 1 - 999.

Default Value: IP PrintWay uses 32 (128 KB) as the trace table size.

Usage Guidelines:
- Storage is allocated for the tables only when internal tracing is active.
- If you change this value, you must restart the FSS to pick up the new value.

Attributes for PrintWay Options Object Class

This section lists attributes that are valid when you create IP PrintWay Options components, which are in object class **printway-options**. These attributes are also valid for the **printer** object class.

Required Attributes
All attributes are optional.

begin-dataset-exit
This **single-valued** attribute specifies the name of an IP PrintWay Begin Data Set exit routine. IP PrintWay calls this exit before processing any records in a data set. In this exit you can add one or more records to the beginning of the data set and you can change IP PrintWay options.

Allowed Values: The name of your exit routine. You can enter a valid combination of 1-8 letters (a-z, A-Z), numbers (0-9), and national characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. If a value contains national characters, enclose the value in quotes. Lowercase letters are converted to uppercase. For example:

```
begin-dataset-exit = ANFUXBD1
```

Default Value: IP PrintWay does not call an exit routine before each data set.

Usage Guidelines: The exit routine must be in an APF authorized library identified either in the STEPLIB statement in the IP PrintWay startup procedure or in a library concatenated to LNKLST.

carriage-control-type
This **single-valued** attribute indicates the type of carriage control characters in the data sets. Specify this attribute only if you want special processing of carriage control characters.

Allowed Values: You can enter one of these fixed values:

ansi Interpret the first character of each record as a carriage control character.

machine Interpret the first character of each record as a carriage control character.

none Do not interpret the first character of each record as a carriage control character. Specify this value if you want to print all carriage control characters as data.

Default Value: IP PrintWay automatically determines the type of carriage controls in each data set.

Usage Guidelines:
- Do not specify **ansi** or **machine** when printing PostScript data sets.
- IP PrintWay processing is currently the same for **ansi** and **machine**.
- IP PrintWay ignores this attribute under any of these conditions:
    - The data set was placed on the spool by Print Interface.
    - The **printway-formatting** attribute contains a value other than **standard**.

– **protocol-type=vtam**.
– NetSpool converted the data to PCL format.

connection-timeout

This **single-valued** attribute specifies the maximum number of seconds that IP PrintWay waits for TCP/IP to report an error connecting to the printer. If the connection timeout value expires before the connection can be established, IP PrintWay attempts to connect to the printer again if retries are requested.

Allowed Values: An integer from 5 - 180.

Default Value: IP PrintWay waits 30 seconds.

Usage Guidelines:

- The default value of 30 seconds is suitable for most printers.
- Do *not* set the timeout value too low because TCP/IP might not be able to connect to the printer in the specified number of seconds due to network traffic.
- Do *not* set the timeout value too high because the IP PrintWay FSA does not process or print any other data sets while it waits for TCP/IP to connect to the printer.
- Specify a higher connection timeout value if the timeout value expires before TCP/IP can connect to the printer when the printer is turned on. IP PrintWay reports a TCP/IP error (TCP/IP ERRNO or 60) in an error message when the connection timeout value expires.
- Specify a higher timeout value if the timeout value expires before TCP/IP can connect to the printer when the printer is turned on. IP PrintWay issues an error message when the connection timeout value expires.
- IP PrintWay ignores this value when **protocol-type=vtam**, **protocol-type=ipp**, or **protocol-type=email**.

dataset-grouping

This **single-valued** attribute indicates how IP PrintWay groups data sets before transmitting them to the target destination.

Allowed Values: You can enter one of these fixed values:

concatenate-job
Transmit data sets in the same JES2 output subgroup within the same transmission. Specify this value to ensure that multiple data sets in the same JES2 output subgroup print together; however when printing on both sides of the paper, a data set might start printing on the back side of the paper.

If **protocol-type=email**, IP PrintWay sends each data set in the same JES2 output subgroup as an attachment in the same e-mail.

job Transmits data sets in the same JES2 output subgroup at the same time, but not in the same transmission. Specify this value to increase the probability that data sets print together.

If **protocol-type=email**, IP PrintWay sends each data set as an attachment in a separate e-mail.

none Transmits each data set as soon as it is processed. Specify this value if you want to manage each data set separately on the remote system.

If **protocol-type=email**, IP PrintWay sends each data set as an attachment in a separate e-mail as soon as it processes the data set.

Default Value: IP PrintWay transmits data sets in the same JES output group at the same time, but not in the same transmission.

Usage Guidelines:

- IP PrintWay ignores this option for data sets that NetSpool allocates on the JES spool; these data sets are not grouped.
- JES2 assigns each data set that Print Interface allocates on the spool to a separate output subgroup.
- If **resubmit-for-filtering=yes** in the printer definition, Print Interface processes all data sets; therefore, each data set is in a separate JES2 output subgroup.
- Data sets in the same JES2 output subgroup must share the same values for certain parameters on the OUTPUT JCL statement. Therefore, if users do not specify exactly the same values for certain OUTPUT parameters, JES2 assigns the output data sets to separate output subgroups. Refer to *z/OS JES2 Initialization and Tuning Guide* for information about how JES2 groups output data sets.
- The **concatenate-job** value does not apply when **protocol-type=ipp**.

delete-form-feed

This **single-valued** attribute indicates the type of form-feed controls that IP PrintWay is to delete from data sets.

Allowed Values: You can enter one of these fixed values:

none   Do not delete any form-feed controls.

leading   Delete form-feed controls at the beginning of each data set.

trailing   Delete form-feed controls at the end of each data set.

both   Delete form-feed controls at the beginning and end of each data set.

Default Value: IP PrintWay does not delete form feeds.

Usage Guidelines:

- This attribute lets you remove blank pages that are printed at the beginning or end of data sets.
- IP PrintWay ignores this attribute under any of these conditions:
  - For protocols other than VTAM, the data set was placed on the spool by Print Interface.
  - **printway-formatting=none**.
  - NetSpool converted the data to PCL format.

description

This **single-valued** attribute lets you provide a description for the component. The description can help you select the correct component from a list.

Allowed Values: Any combination of 1-256 letters (a-z, A-Z), numbers (0-9), blanks, and special characters (such as # $ @ ! = / -). If the value contains blanks or special characters, enclose it in single or double quotes.

Default Value: None.

document-header

This **single-valued** attribute specifies printer-specific data that IP PrintWay includes at the beginning of the document and sends to the remote printer or print server. For example, you might specify printer commands to change the printer default font.

Allowed Values: A combination of 1-292 letters, numbers, blanks, and special characters. You can also specify the following special values, which IP PrintWay converts to EBCDIC hex values:

Value	Hex (EBCDIC)	Description
<FF>	0C	Form feed
<CR>	0D	Carriage return
<LF>	25	Line feed
<ESC>	27	Escape
<SP>	40	Space

If you specify these special values, use EBCDIC representation for the rest of the value and specify **translate-document-header=yes** (default) if the printer accepts ASCII data. If the value contains blanks or special characters, enclose it in single or double quotes, for example:

```
document-header="<esc>E<esc>&l10<esc>(s17H"
```

To enter a value in hexadecimal format, prefix the value with the letter **x** and enclose the value in single quotes. For example, this example specifies the same value in ASCII representation, in hexadecimal format. Because the value is in ASCII, also specify **translate-document-header=no** if the printer accepts ASCII data. For example:

```
document-header=x'1B451B266C31301B2873313748'
```

Default Value: IP PrintWay does not include any data at the beginning of a document.

document-trailer

This **single-valued** attribute specifies printer-specific data that IP PrintWay includes at the end of the document and sends to the remote printer or print server. For example, if the **document-header** attribute modifies the printer configuration, you might specify this attribute to restore the default printer configuration.

Allowed Values: A combination of 1-292 letters, numbers, blanks, and special characters. You can also specify the following special values, which IP PrintWay converts to EBCDIC hex values:

Value	Hex (EBCDIC)	Description
<FF>	0C	Form feed
<CR>	0D	Carriage return
<LF>	25	Line feed
<ESC>	27	Escape
<SP>	40	Space

If you specify these special values, use EBCDIC representation for the rest of the value and specify **translate-document-trailer=yes** (default) if the printer accepts ASCII data. If the value contains blanks or special characters, enclose it in single or double quotes.

For example:

```
document-trailer="<esc>E"
```

To enter a value in hexadecimal format, prefix the value with the letter **x** and enclose the value in single quotes. This example specifies the same value in ASCII representation, in hexadecimal format. Because the value is in ASCII, also specify **translate-document-trailer=no** if the printer accepts ASCII data. For example:

```
document-trailer=x'1B45'
```

Default Value: IP PrintWay does not include any data at the end of a document.

end-dataset-exit
This **single-valued** attribute specifies the name of an IP PrintWay End Data Set exit routine. IP PrintWay calls the exit you specify after processing all records in a data set. In this exit you can add one or more records to the end of the data set. You can also inspect IP PrintWay options, but you cannot change them.

Allowed Values: The name of your exit routine. You can enter a valid combination of 1-8 letters (a-z, A-Z), numbers (0-9), and national characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. If a value contains national characters, enclose the value in quotes. Lowercase letters are converted to uppercase. For example:

```
end-dataset-exit = ANFUXED1
```

Default Value: IP PrintWay does not call an exit routine after each data set.

Usage Guidelines: The exit routine must be in an APF authorized library identified either in the STEPLIB statement in the IP PrintWay startup procedure or in a library concatenated to LNKLST.

failure-retention-period
This **single-valued** attribute specifies the amount of time IP PrintWay retains data sets on the JES spool after all retry transmission attempts to the remote printer or print server have failed.

Allowed Values: You can specify the fixed value FOREVER, or a time value in the following format: *hhhh*:*mm*:*ss*, where

hhhh indicates the hours (0000-9999)
mm indicates the minutes (00-59)
ss indicates the seconds (00-59)
FOREVER means retain data sets forever on the JES spool.

For example:
```
failure-retention-period = 12:15:10   (12 hours, 15 minutes, 10 seconds)
failure-retention-period = 5:12       (5 minutes, 12 seconds)
failure-retention-period = 5          (5 seconds)
failure-retention-period = FOREVER
```

Default Value: IP PrintWay does not retain data sets on the JES spool.

Usage Guidelines: The job submitter can override this value.

line-termination
This **single-valued** attribute specifies the end-of-line controls required by the target printer. IP PrintWay translates the controls to ASCII, if necessary, and adds them to the end of each line.

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Allowed Values: A 1-4 character string (2-8 characters if specified in hexadecimal format) that is the EBCDIC representation of the end-of-line control IP PrintWay uses at the end of a line. To enter a hexadecimal value, begin the value with the letter **x** and enclose the value in quotes. Lowercase letters are converted to uppercase.

This example specifies the carriage-return and line-feed controls:

```
line-termination=X'0D25'
```

Default Value: IP PrintWay uses one of the following end-of-line controls, depending on the selected protocol:

Protocol   **Default Controls in EBCDIC**

LPR, direct sockets, IPP, e-mail
> X'25' (line-feed control)

VTAM   X'0D15' (carriage-return and new-line controls)

Usage Guidelines: IP PrintWay ignores this attribute under any of these conditions:
- For protocols other than VTAM, Print Interface allocated the data set on the JES spool.
- **printway-formatting=none**.
- NetSpool converted the data to PCL format.

name
This **single-valued** attribute specifies the name of the component.

Note: This is a *non-settable* attribute. Do *not* specify the **name** attribute on the PIDU **create**, **force-create**, or **modify** command; instead, specify the name as an operand on the command. However, you can specify the **name** attribute when you construct a condition for the **where** predicate on the **list** and **export** commands.

Allowed Values: Any combination of 1-17 letters (a-z, A-Z), numbers (0-9), and special characters (such as $ # @ . - = /). Blank characters are not allowed.

Default Value: None.

omit-line-termination-at-eof
This **single-valued** attribute indicates whether IP PrintWay is to omit the LF (line feed) control (or other control specified in the **line-termination** attribute) at the end of each document.

Allowed Values: You can enter one of these fixed values:

yes   IP PrintWay omits the line termination control at the end of each document.

no   IP PrintWay includes the line termination control at the end of each document.

Default Value: IP PrintWay includes the line termination control at the end of each document.

Usage Guidelines:
- Specify **yes** if a line termination control at the end of a document causes printing problems. For example, printing problems can occur when applications add transparent data to the end of data.

- Specify **no** (default) if your printer requires a line termination control at the end of the document in order to print the data.
- IP PrintWay ignores this attribute under any of these conditions:
  - The data set was placed on the spool by Print Interface.
  - **printway-formatting=none**.
  - **protocol-type=vtam**.
  - NetSpool converted the data to PCL format.

printway-formatting

This **single-valued** attribute specifies the type of translation and formatting that IP PrintWay performs before transmitting data sets to the remote system.

Allowed Values: You can enter one of these fixed values:

none IP PrintWay does not translate or format data. Select this value to print binary data, such as AFP or PCL data.

standard

IP PrintWay translates data to ASCII or EBCDIC, adds line-termination controls, and formats data into pages. For the VTAM protocol, IP PrintWay converts line data to SCS or DSC/DSE format.

translate-only

IP PrintWay translates data to ASCII or EBCDIC and adds line-termination controls; however, it does not format data into pages. For the VTAM protocol, this option is equivalent to **standard**.

use-fcb

IP PrintWay takes the same action as for **standard** except that if an FCB is specified for the data set or as a JES default, IP PrintWay formats using the FCB.

Default Value: IP PrintWay performs standard processing except under the conditions described in "Usage Guidelines".

Usage Guidelines: Under the following conditions, IP PrintWay uses the **none** value and ignores any other values:

- **vtam-send-as-transparent=yes**.
- **to-remote-psf=yes**.
- NetSpool converted the data to PCL format.
- For protocols other than VTAM, Print Interface processed the data set.

printway-postscript

This **single-valued** attribute specifies the type of PostScript header that IP PrintWay adds to the beginning of each data set.

Allowed Values: You can enter one of these fixed values:

add-header IP PrintWay adds PostScript header **%!**

always-landscape

IP PrintWay takes the same action as for **landscape**; however, IP PrintWay also adds the landscape header to data sets that already have a PostScript header.

landscape IP PrintWay adds a PostScript header for printing in the landscape direction (lines parallel to the long edge of the paper) to data sets that do not already have PostScript headers.

ignore-header

IP PrintWay ignores the PostScript header on data sets and processes all data sets as non-PostScript data sets.

Default Value: IP PrintWay does not add PostScript headers; however, IP PrintWay processes data sets that already contain a PostScript header (%!) as PostScript data sets.

Usage Guidelines:
- If you specify **landscape** or **always-landscape**, also specify **printway-formatting=standard** (default).
- If you specify **add**, IP PrintWay ignores the **printway-formatting** attribute.
- Do not specify **landscape** if any data sets already have PostScript headers.
- IP PrintWay ignores this attribute under any of these conditions:
    - The data set was placed on the spool by Print Interface.
    - **printway-formatting=none**.
    - **protocol-type=vtam**.
    - NetSpool converted the data to PCL format.
- If **protocol-type=email**, do *not* specify this attribute.

record-exit

This **single-valued** attribute specifies the name of an IP PrintWay Record exit routine. IP PrintWay calls this exit for each record in a data set. In a Record exit you can add one or more records, replace a record, or delete a record. You can also inspect IP PrintWay options, but you cannot change them.

Allowed Values: The name of your exit routine. You can enter a valid combination of 1-8 letters (a-z, A-Z), numbers (0-9), and national characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. If a value contains national characters, enclose the value in quotes. Lowercase letters are converted to uppercase. For example:

```
record-exit = ANFUXRC1
```

Default Value: IP PrintWay does not call an exit routine for each record in a data set.

Usage Guidelines: The exit routine must be in an APF authorized library identified either in the STEPLIB statement in the IP PrintWay startup procedure or in a library concatenated to LNKLST.

response-timeout

This **single-valued** attribute specifies the number of seconds that IP PrintWay waits for a response from the remote printer or print server before reporting an error. After an error occurs, IP PrintWay attempts to send the data again if retries are requested.

Allowed Values: An integer from 0 - 86400.

Default Value: IP PrintWay waits 600 seconds (10 minutes) for a response.

Usage Guidelines:
- Do not set the value too high because the IP PrintWay FSA does not process any other data sets while it waits.
- Do not set the value too low for printers that print slowly or have a small buffer.

- While IP PrintWay waits for a response from the printer, the IP PrintWay FSA does not process or print any other data sets.
- IP PrintWay ignores this value when **protocol-type=email**.

retry-limit

This **single-valued** attribute specifies the number of times that IP PrintWay retries an unsuccessful transmission.

Allowed Values: An integer from 0 - 32767.

Default Value: IP PrintWay does not retry the transmission.

Usage Guidelines:

- See "Handling Unsuccessful Data Transmissions" on page 170 for information about how the **retry-time** and **retry-limit** attributes work together.
- Retries are not recommended when you send output to an e-mail destination; therefore, when **protocol-type=email**, do not specify the **retry-limit** and **retry-time** attributes.

retry-time

This **single-valued** attribute specifies the amount of time IP PrintWay waits between retries of a transmission. For example, when the retry time is 1 minute, IP PrintWay retries every minute, up to the number of retries in the **retry-limit** attribute.

Allowed Values: A value in the following time format: *hhhh*:*mm*:*ss*, where:

hhhh indicates hours (0000-9999)
mm indicates minutes (00-59)
ss indicates seconds (00-59)

For example:
```
retry-time = 1:00:00        (1 hour, 0 minutes, 0 seconds)
retry-time = 5:30           (5 minutes, 30 seconds)
retry-time = 5              (5 seconds)
```

Default Value: IP PrintWay does not wait between retries.

Usage Guidelines:

- See "Handling Unsuccessful Data Transmissions" on page 170 for information about how the **retry-time** and **retry-limit** attributes work together.
- Retries are not recommended when you send output to an e-mail destination; therefore, when **protocol-type=email**, do not specify the **retry-limit** and **retry-time** attributes.

successful-retention-period

This **single-valued** attribute specifies the amount of time IP PrintWay retains data sets on the JES spool after successful transmission.

Allowed Values: You can specify the fixed value FOREVER, or a time value in the following format: *hhhh*:*mm*:*ss*, where:

hhhh indicates the hours (0000-9999)
mm indicates the minutes (00-59)
ss indicates the seconds (00-59)
FOREVER means retain data sets forever on the JES spool.

For example:
```
successful-retention-period = 12:15:10  (12 hours, 15 minutes, 10 seconds)
successful-retention-period = 5:12      (5 minutes, 12 seconds)
successful-retention-period = 5         (5 seconds)
successful-retention-period = FOREVER
```

Default Value: IP PrintWay does not retain data sets on the JES spool.

Usage Guidelines:

- The job submitter can override this value.
- If **protocol-type=email**, the transmission is considered successful when z/OS UNIX sendmail accepts the e-mail request; the transmission to remote recipients might fail later.

translate-document-header

This **single-valued** attribute indicates whether IP PrintWay must translate the string in the **document-header** attribute to the code page required by the printer before sending it to the remote printer or print server.

Allowed Values: You can enter one of these fixed values:

yes   IP PrintWay translates the document header to the code page required by the printer. Select this value if, for example, you specify a document header in EBCDIC representation and the printer accepts ASCII data.

no   IP PrintWay does not translate the document header.

Default Value: IP PrintWay translates the string to the code page required by the printer.

translate-document-trailer

This **single-valued** attribute indicates whether IP PrintWay must translate the string in the **document-trailer** attribute to the code page required by the printer before sending it to the remote printer or print server.

Allowed Values: You can enter one of these fixed values:

yes   IP PrintWay translates the document trailer to the code page required by the printer. Select this value if, for example, you specify a document trailer in EBCDIC representation and the printer accepts ASCII data.

no   IP PrintWay translates the document trailer to the code page required by the printer.

Default Value: IP PrintWay translates the string to the code page required by the printer.

transparent-data-character

This **single-valued** attribute specifies the character that designates transparent data in the input or output data stream.

Allowed Values: A 1-character string (1-2 characters if specified in hexadecimal format). To enter a hexadecimal value, begin the value with the letter **x** and enclose the value in single or double quotes.

For example: `transparent-data-character=X'FB'`

Default Value: IP PrintWay uses X'35' as the transparent data character.

Usage Guidelines:

- For protocols other than VTAM, this character designates transparent data in the input data stream. IP PrintWay removes transparent data controls and does not translate the transparent data that follows the controls to ASCII.
- For the VTAM protocol, if **vtam-send-as-transparent=yes**, IP PrintWay uses this character to designate transparent data in the output data stream.
- IP PrintWay ignores this attribute under any of these conditions unless **vtam-send-as-transparent=yes**:
  - The data set was placed on the spool by Print Interface.
  - **printway-formatting=none**.
  - **protocol-type=vtam**.
  - NetSpool converted the data to PCL format.

Attributes for Processing Object Class

This section lists attributes that are valid when you create Processing components, which are in object class **processing**. These attributes are also valid for the **printer** object class.

Required Attributes

No attributes are required; however, you might need to specify the **printer-codepage** attribute for some data formats to print correctly.

db-translate-table

This **single-valued** attribute specifies the name of the translation table IP PrintWay uses to convert double-byte character set (DBCS) data from EBCDIC to ASCII.

Allowed Values: You can enter one of these fixed values, depending on the language:

Language	Allowed Values
Chinese	**big5**, **schinese**, **tchinese**.
Japanese	**euckanji**, **ibmkanji**, **jis78kj-ascii**, **jis78kj-jisroman**, **jis83kj-ascii**, **jis83kj-jisroman**, **sjiskanji**
Korean	**hangeul**, **ksc5601**.

Default Value: IP PrintWay uses code pages to convert data to ASCII.

Usage Guidelines:

- If either **document-codepage** or **printer-codepage** is specified, IP PrintWay uses the code pages to convert data and ignores this attribute.
- IP PrintWay transmits the data without converting it to ASCII when the value is **ibmkanji**.
- The binary table data sets that the translation tables come from are:
  - TCPCHBIN (**big5**, **tchinese**)
  - TCPHGBIN (**hangeul**, **ksc5601**)
  - TCPKJBIN (**euckanji**, **jis78kj**, **jis83kj**, **sjiskanji**)
  - TCPSCBIN (**schinese**)
- For **jis78kj** and **jis83kj**, IP PrintWay uses the following shift-in escape sequences and ignores the value in the **printway-sosi-mode** attribute: **ascii**: ESC(B **jisroman**: ESC(J
- IP PrintWay ignores this attribute when **protocol-type=vtam**.

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description
This **single-valued** attribute lets you provide a description for the component. The description can help you select the correct component from a list.

Allowed Values: Any combination of 1-256 letters (a-z, A-Z), numbers (0-9), blanks, and special characters (such as # $ @ ! = / -). If the value contains blanks or special characters, enclose it in single or double quotes.

Default Value: None.

document-codepage
This **single-valued** attribute specifies the code page used to create documents submitted to this printer definition. Print Interface, NetSpool, and IP PrintWay use this code page as the source when converting documents from ASCII to EBCDIC or from EBCDIC to ASCII.

Allowed Values: A valid code page name. An example of a valid code page is:

```
document-codepage = ISO8859-1
```

Default Value: Print Interface determines the default as follows:

- If the print request was submitted from the local z/OS system, Print Interface uses the code page for the z/OS locale, usually an EBCDIC code page.
- If the print request was submitted from a remote system, Print Interface uses the ASCII code page specified in the Infoprint Server configuration file, **aopd.conf** or, if not specified, code page ISO8859-1.

NetSpool uses the EBCDIC code page specified in the Infoprint Server configuration file, **aopd.conf** or, if not specified, code page IBM-1047.

IP PrintWay uses the code page in the **default-document-codepage** attribute in the **printway-fss** object class or, if not specified, code page IBM-1047.

Usage Guidelines:

- In most cases, the default value is suitable. One exception is when you need to print ASCII documents submitted with the **lp** command. In this case, specify an ASCII code page either in this attribute or on the **lp** command.
- For code page names, refer to *z/OS C/C++ Programming Guide*.
- Do *not* specify this attribute or the **printer-codepage** attribute if you want IP PrintWay to use the standard TCP/IP translation table to convert data from EBCDIC to ASCII. Also, specify **old-style-translation=yes** in the **printway-fss** object class.
- NetSpool converts data between code pages only if **netspool-formatting=convert-to-pcl** in the **netspool-options** object class; otherwise, NetSpool ignores this attribute.

document-formats-supported
This **multi-valued**, **list** attribute indicates which data formats a printer supports. Print Interface rejects a print job with a data format that is not supported.

Allowed Values: Enter one or more of these fixed values:

line-data   Bytes map to characters; data is stored in records with carriage-control and table-reference characters.

modca-p   IBM Mixed Object Document Content Architecture Presentation.

pcl   Hewlett Packard Printer Control Language.

pdf	Adobe Portable Document Format.
postscript	Adobe PostScript.
sap	SAP output text format (OTF) or ABAP format.
text	Bytes map to characters; only contains LF, CR, HT, VT, and FF control characters.
other	All data formats that are not one of the other types.

For example:

```
document-formats-supported = {line-data modca-p text};
```

Default Value: Print Interface accepts all data formats in the print request.

Usage Guidelines: In a PSF printer definition, specify **line-data**, **modca-p**, and **text**; if your installation has installed Infoprint Server transforms (specified in the **filters** attribute), also specify other supported data formats in this attribute. For example, if your installation uses the PCL to AFP transform, also specify **pcl** in this attribute.

duplexes-supported

This **multi-valued**, **list** attribute indicates whether the printer can print on one or two sides of the paper. Print Interface rejects a print job that requests an option in the **duplex** job attribute that the printer does not support.

Allowed Values: Enter one or more of these fixed values:

no	The printer can print on one side of the paper.
yes	The printer can print on both sides of the paper so the top edge of side 1 is the top edge of side 2.
tumble	The printer can print on both sides of the paper but tumbles the print so the top edge of side 1 is the bottom edge of side 2.

The printer in this example can print on one or two sides of the paper but cannot tumble the output:

```
duplexes-supported = {no yes};
```

Default Value: Print Interface accepts all values in the **duplex** job attribute.

Usage Guidelines: This attribute does not apply to duplexing requested in a form definition.

filters

This **multi-valued**, **value-map** attribute associates data formats with a filter program for the data format. Print Interface invokes the specified filter before writing data to the output data set. NetSpool and IP PrintWay do not support filters.

Allowed Values: One or more value pairs in the format: *dataformat* -> *filterpath* [*options*], where:

dataformat	Specifies the format of the input data. Enter one of these fixed values:

line-data	Bytes map to characters; data is stored in records with carriage-control and table-reference characters.
modca-p	IBM Mixed Object Document Content Architecture Presentation.

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pcl	Hewlett Packard Printer Control Language.
pdf	Adobe Portable Document Format.
postscript	Adobe PostScript.
sap	SAP output text format (OTF) or ABAP format.
text	Bytes map to characters; only contains LF, CR, HT, VT, and FF control characters.
other	All data formats that are not one of the other types.

filterpath **[***options***]**

Specifies the path name of the filter, followed by filter options. See Chapter 11, "Planning Printer Definitions for Print Interface" on page 93 and Chapter 14, "Planning Printer Definitions for Infoprint Server Transforms" on page 201 for information about the filters that Infoprint Server and Infoprint Server Transforms provide and the filter options you can specify.

Specify the full path name unless the filter is in a directory named either in the LIBPATH (for filter DLLs) or PATH (for UNIX filters) environment variable. For a UNIX filter, type **spawn** before the path name. If the path name contains special characters (such as *l*), or if you specify filter options, enclose the path name and options in single or double quotes.

You can specify one or more value pairs. Enclose the value pairs with braces. Some examples are:

```
filters = {text -> aopfiltr.so}
filters = {pcl -> "pcl2afp.dll %filter-options" pdf -> "ps2afp.dll %filter-options"}
filters = (text -> "spawn /usr/mylib/mfilter myoption1 myoption2")
```

Default Value: Print Interfaces does not use any filters.

forms-supported

This **multi-valued**, **list** attribute specifies the names of the forms the printer supports. Print Interface rejects a print job that requests a forms name in the **forms** attribute that the printer does not support.

Allowed Values: Any combination of 1 - 8 letters (a-z, A-Z), numbers (0-9), and special characters (# $ @); blanks and other special characters are not allowed. Lowercase letters are converted to uppercase. If you specify more than one forms name, separate the forms names with spaces and enclose the list in braces, for example:

```
forms-supported = {STANDARD FORM0001}
```

Default Value: Print Interface accepts any forms name in the **forms** job attribute.

Usage Guidelines: If forms is a JES work-selection criterion, specify the same form names that are defined to JES.

input-tray-map

This **multi-valued**, **value-map** attribute associates input tray names with input tray numbers. Print Interface rejects a print job that requests an input tray in the **input-tray** job attribute that the printer does not support.

Allowed Values: One or more value pairs in the format: *name -> number*, where:

name   A name that can be used by a job submitter in the **input-tray** job

attribute. Specify from 1-16 letters, numbers, and special characters (such as # $ @ -). If the value contains blanks or special characters, enclose the value in single or double quotes.

number   An integer from 1 - 255 that identifies the paper source. To determine the tray numbers for your printer, see the printer documentation. These names are usually assigned to these numbers:

Name	Number
alternate or top	1
bottom	2
envelope	65
manual	100

Enclose the values with braces. For example:

```
input-tray-map = {top -> 1 bottom -> 2}
```

Default Value: No tray names are associated with numbers. If a job submitter specifies the **input-tray** job attribute, it is ignored.

maximum-copies
This **single-valued** attribute specifies the maximum number of copies that Print Interface and IP PrintWay allow to be printed.

Allowed Values: An integer from 1 - 32640.

Default Value: No limit to the number of copies.

Usage Guidelines:
- The number of copies specified in a form definition or on a TCP/IP command, such as the LPR command, are not included in this value.
- IP PrintWay ignores this attribute when **protocol-type=vtam** or **protocol-type=email**.

maximum-document-size
This **single-valued** attribute specifies the maximum number of bytes that Print Interface and IP PrintWay allow for all documents submitted with the same request, including copies. You can use this attribute to:
- Limit the size of jobs sent to a printer.
- Set a size limit if you receive a message that IP PrintWay is trying to send a document to an LPD buffer that is too small to receive the data set.

Allowed Values: An integer from 1 - 2147483646. Omit this attribute if you want no size limit.

Default Value: Print Interface and IP PrintWay do not limit the size of print jobs.

Usage Guidelines: IP PrintWay ignores this attribute when **protocol-type=vtam**.

name
This **single-valued** attribute specifies the name of the component.

Note: This is a *non-settable* attribute. Do *not* specify the **name** attribute on the PIDU **create**, **force-create**, or **modify** command; instead, specify the name

as an operand on the command. However, you can specify the **name** attribute when you construct a condition for the **where** predicate on the **list** and **export** commands.

Allowed Values: Any combination of 1-17 letters (a-z, A-Z), numbers (0-9), and special characters (such as $ # @ . - = /). Blank characters are not allowed.

Default Value: None.

output-bin-map

This **multi-valued**, **value-map** attribute associates output bin names with output bin numbers. Print Interface rejects print jobs that request an output bin in the **output-bin** job attribute that the printer does not support.

Allowed Values: One or more value pairs in the format: *name -> number*, where:

name   A name that can be used by a job submitter in the **output-bin** job attribute. Specify from 1-16 letters, numbers, and special characters (such as # $ @ -). If the value contains blanks or special characters, enclose the value in single or double quotes.

number   An integer from 1 - 65535 that identifies the output bin on the printer. To determine the bin numbers for your printer, see the printer documentation.

Enclose the values with braces. For example:

```
output-bin-map = {bottom -> 1 side -> 2}
```

Default Value: No bin names are associated with numbers. If a job submitter specifies the **output-bin** job attribute, it is ignored.

pcl-line-density

This **single-valued** attribute specifies the number of lines per inch to be printed on a page when NetSpool converts SNA character string (SCS) and 3270 data streams to PCL data streams. NetSpool uses this value only when the SCS data stream does not specify the line density. NetSpool always uses this value for 3270 data streams.

Allowed Values: An integer from 1 - 72.

Default Value: The PCL Line Spacing or Vertical Motion Index command specified in the **document-header** attribute is used. If these commands are not specified, the line density set on the printer's control panel is used.

Usage Guidelines:

- NetSpool uses this attribute only when **netspool-formatting=convert-to-pcl**; otherwise, this attribute is ignored.
- If **scs-automatic-page-orientation=yes**, you should specify a value in this attribute.

pcl-orientation

This **single-valued** attribute specifies the orientation of each page when NetSpool converts SNA character string (SCS) and 3270 data streams to PCL data streams.

Allowed Values: You can enter one of these fixed values:

landscape   Lines print parallel to the paper's long edge.

none   NetSpool does not specify a page orientation in the PCL data

| stream. The PCL Logical Page Orientation command specified in
| the **document-header** attribute or, if not specified, the orientation
| set on the printer's control panel is used.

| **portrait**   Lines print parallel to the paper's short edge.

| ***Default Value:*** NetSpool does not specify a page orientation in the PCL data
stream. The PCL Logical Page Orientation command specified in the
document-header attribute is used. If this command is not specified, the orientation
set at the printer's control panel is used.

| ***Usage Guidelines:***
| • NetSpool uses this attribute only when **netspool-formatting=convert-to-pcl**;
| otherwise, this attribute is ignored.
| • If **scs-automatic-page-orientation=yes**, NetSpool can override the value in this
| attribute and change the orientation of a page.

pcl-print-density
| This **single-valued** attribute specifies the number of characters per inch to be
printed on a line when NetSpool converts SNA character string (SCS) and 3270
data streams to PCL data streams. NetSpool uses this value only when the SCS
data stream does not specify the print density. NetSpool always uses this value for
3270 data streams.

| ***Allowed Values:*** An integer from 1 - 255.

| ***Default Value:*** The PCL Pitch or Horizontal Motion Index command specified in
the **document-header** attribute is used. If these PCL commands are not specified,
the print density set on the printer's control panel is used.

| ***Usage Guidelines:***
| • NetSpool uses this attribute only when **netspool-formatting=convert-to-pcl**;
| otherwise, this attribute is ignored.
| • If **scs-automatic-page-orientation=yes**, you should specify a value in this
| attribute.

print-error-reporting-supported
This **multi-valued**, **list** attribute specifies the types of errors a printer can report.
Print Interface rejects print jobs that request error reporting in the
print-error-reporting attribute that the printer does not support.

Allowed Values: Enter one or more of the following fixed values:

all   The printer can report both print-positioning and invalid-character
errors.

character   The printer can report invalid-character errors and suppress
reporting of print-positioning errors.

none   The printer can suppress reporting of both print-positioning and
invalid-character errors.

position   The printer can report print-positioning errors and suppress
reporting of print-positioning errors.

If you specify more than one value, separate the values with spaces and enclose
the list in braces. For example:

```
print-error-reporting-supported = {all}
```

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Default Value: Print Interface accepts all values in the **print-error-reporting** job attribute.

print-page-header

This **single-valued** attribute indicates whether IP PrintWay adds a header at the top of each page when formatting data into pages. The header prints on three lines at the top of each page.

Allowed Values: You can enter one of these fixed values:

yes IP PrintWay adds a header.

no IP PrintWay does *not* add a header.

Default Value: IP PrintWay adds a page header.

Usage Guidelines:

•

  IP PrintWay ignores this attribute under any of these conditions:
  – The data set contains carriage control characters; IP PrintWay always uses the carriage control characters to format pages and does not add a page header.
  – Line data was converted to another format such as PCL, PostScript, PDF, SCS, or DSC format.
  – Print Interface converted the line data into text data.
  – The data set contains a PostScript header.
  – **printway-pagination=suppress**.
  – **printway-formatting=none** or **printway-formatting=translate-only**.
• If **protocol-type=email**, specify **print-page-header=no** if you do not want a header added to the e-mail text.

printer-codepage

This **single-valued** attribute specifies the code page used by the printer or by z/OS UNIX sendmail. Print Interface, NetSpool, and IP PrintWay use this code page as the target when converting data from ASCII to EBCDIC or EBCDIC to ASCII.

Allowed Values: A valid code page name. Examples of valid code pages are:

```
printer-codepage = ISO8859-1
printer-codepage = IBM-500
```

Default Value: If this attribute is not specified, the default differs for each component of Infoprint Server that uses this attribute:

• Print Interface does not convert data from ASCII to EBCDIC or EBCDIC to ASCII.
• NetSpool uses code page IBM-850 as the printer code page.
• If **protocol-type=vtam** or **protocol-type=email**, IP PrintWay does not convert data between code pages. If **protocol-type** is set to another value, IP PrintWay uses code page IBM-850 as the printer code page.

Usage Guidelines:

• If Print Interface uses this printer definition, you should specify this attribute; if you do not specify a code page, Print Interface does not convert data, so some documents processed by Print Interface might not print correctly.
• For code page names, refer to *z/OS C/C++ Programming Guide*.
• In an IP PrintWay printer definition for an ASCII printer, specify an ASCII code page such as ISO8859-1.

- In a PSF for OS/390 printer definition, or in an IP PrintWay printer definition with **protocol-type=vtam** , specify an EBCDIC code page such IBM-1047.
- If **protocol-type=email**, specify an EBCDIC code page such as IBM-1047 because z/OS UNIX sendmail expects EBCDIC data.
- Do *not* specify this attribute or the **document-codepage** attribute if you want IP PrintWay to use the standard TCP/IP translation table to convert data from EBCDIC to ASCII. Also, specify **old-style-translation=yes** in the IP PrintWay FSS definition (**printway-fss** object class).
- NetSpool converts data between code pages only if **netspool-formatting=convert-to-pcl** in the **netspool-options** object class; otherwise, NetSpool ignores this attribute.

printway-bottom-margin

This **single-valued** attribute specifies the number of blank lines to leave in the bottom margin. IP PrintWay uses this value when formatting data into pages.

Allowed Values: An integer from 0 - 255.

Default Value: IP PrintWay does not leave a bottom margin.

Usage Guidelines: IP PrintWay ignores this attribute under any of these conditions:
- The data set contains carriage control characters.
- Line data was converted to another format such as PCL, PostScript, PDF, SCS, or DSC format.
- The data set was placed on the spool by Print Interface.
- The data set contains a PostScript header.
- **printway-formatting=none** or **printway-formatting=translate-only**.
- **printway-pagination=suppress**.
- NetSpool converted the data to PCL format.

printway-page-height

This **single-valued** attribute specifies the number of lines to place on a page. This number includes any blank lines in the top and bottom margins, lines for the optional page header, and data lines. IP PrintWay uses this attribute when formatting data into pages.

Allowed Values: An integer from 0 - 255.

Default Value: IP PrintWay uses 58 lines as the page length.

Usage Guidelines: IP PrintWay ignores this attribute under any of these conditions:
- The data set contains carriage control characters.
- Line data was converted to another format such as PCL, PostScript, PDF, SCS, or DSC format.
- Print Interface converted line data into text data.
- The data set contains a PostScript header.
- **printway-formatting=none** or **printway-formatting=translate-only**.
- **printway-pagination=suppress**.
- NetSpool converted the data to PCL format.

printway-pagination

This **single-valued** attribute indicates whether IP PrintWay formats data into pages. When formatting data, IP PrintWay can add a header to each page and leave blank lines for top and bottom margins.

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Allowed Values: You can enter one of these fixed values:

allow IP PrintWay formats data into pages if possible.

suppress IP PrintWay does *not* format data into pages.

Default Value: IP PrintWay formats data into pages.

Usage Guidelines:
- If you specify **allow** (default), you can also specify these attributes:
  - **printway-top-margin**
  - **printway-bottom-margin**
  - **printway-page-height**
  - **print-page-header**
- IP PrintWay ignores this attribute under any of these conditions:
  - Line data was converted to another format such as PCL, PostScript, PDF, SCS, or DSC format.
  - Print Interface converted line data into text data.
  - NetSpool converted the data to PCL format.
  - The data set contains carriage control characters.
  - The data set contains a PostScript header.
  - **printway-formatting=none** or **printway-formatting=translate-only**.

printway-sosi-mode
This **single-valued** attribute specifies a value that indicates the shift-out shift-in (SOSI) mode IP PrintWay uses to delimit double-byte character set (DBCS) data in the ASCII data stream.

Allowed Values: You can enter one of these fixed values:

ascii IP PrintWay translates each EBCDIC SOSI character to an ASCII SOSI character (X'0E' to X'1E' or X'0F' to X'1F').

ebcdic IP PrintWay leaves the EBCDIC SOSI characters unchanged and delimits DBCS data with the EBCDIC SOSI characters.

none IP PrintWay removes the SOSI characters and does not delimit DBCS data.

space IP PrintWay translates each EBCDIC SOSI character to an ASCII space character (X'20').

Default Value: IP PrintWay removes SOSI characters and does not delimit DBCS data.

Usage Guidelines: This attribute does not apply when:
- **db-translate-table** = **jis78kj-ascii**, **jis78kj-jisroman**, **jis83kj-ascii**, **jis83kj-jisroman**, or **ibmkanji**. See the **db-translate-table** for more information.
- **protocol-type=vtam**.

printway-top-margin
This **single-valued** attribute specifies the number of blank lines to leave in the top margin. IP PrintWay uses this value when formatting data into pages.

Allowed Values: An integer from 0 - 255.

Default Value: IP PrintWay does not leave a top margin.

Usage Guidelines: IP PrintWay ignores this attribute under any of these conditions:
- Line data was converted to another format such as PCL, PostScript, PDF, SCS, or DSC format.
- Print Interface converted line data into text data.
- NetSpool converted the data to PCL format.
- The data set contains carriage control characters.
- The data set contains a PostScript header.
- **printway-formatting=none** or **printway-formatting=translate-only**.
- **printway-pagination=suppress**.

resubmit-for-filtering

This **single-valued** attribute indicates whether a filter in the **filters** attribute is to be used for data sets submitted as batch jobs to IP PrintWay. When **resubmit-for-filtering=yes**, IP PrintWay resubmits batch data sets to Print Interface. Print Interface calls the filter (if any) associated with the input data format and then writes the data to a new output data set on the JES spool for subsequent processing by IP PrintWay.

Allowed Values: You can enter one of these fixed values:

yes   At least one filter in the **filters** attribute applies to batch data sets.

no   No filters apply to batch data sets.

Default Value: no

Usage Guidelines:
- For optimum system performance, specify **yes** only when needed:
  - Specify **yes** if you also specify the **afp2pcl**, **afp2ps**, or **afp2pdf** DLLs in the **filters** attribute.
  - Do *not* specify **yes** if the *only* filter specified is **aopfiltr.so**.
- This attribute has meaning only for IP PrintWay printer definitions. It is ignored for PSF for OS/390 and General printer definitions.

scs-automatic-page-orientation

This **single-valued** attribute indicates whether NetSpool is to automatically determine the orientation (portrait or landscape) of each page based on the line length and page length of that page. If necessary, NetSpool also reduces the size of the print (the font size) and increases the line density so that data fits on a line. NetSpool uses this attribute only when it converts SCS character string (SCS) data streams to PCL data streams.

Allowed Values: Enter one of these fixed values:

no   NetSpool does not automatically determine the page orientation.

yes   NetSpool automatically determines the page orientation if possible. If NetSpool cannot determine the page density and line density, it uses the orientation specified in the **pcl-orientation** attribute.

Default Value: NetSpool does not automatically determine the page orientation.

Usage Guidelines:
- NetSpool uses this attribute only when it converts SCS data streams and only when **netspool-formatting=convert-to-pcl**; otherwise, this attribute is ignored.

- If **scs-automatic-page-orientation=yes**, you should specify values in the following attributes:
  - **pcl-print-density**
  - **pcl-line-density**
  - **scs-maximum-line-length**
  - **scs-maximum-page-length**
- NetSpool uses the line and page lengths specified in SCS controls and in the **pcl-print-density**, **pcl-line-density**, **scs-maximum-line-length**, and **scs-maximum-page-length** attributes to determine the page orientation of each page. If the line length is greater than the page length, NetSpool sets the orientation to landscape; otherwise it sets the orientation to portrait. When NetSpool sets the orientation to landscape, if the **maximum-line-length** attribute (or the MPP in the SCS SHF control) is greater than 106, NetSpool sets the print density to 15 characters per inch and the line density to 8 lines per inch.

scs-bottom-margin

This **single-valued** attribute specifies the number of the line at which data ends on each page. NetSpool uses this value when it converts SNA character string (SCS) data streams to either line data streams or PCL data streams. IP PrintWay uses this value when it converts line data streams to SCS data streams.

Allowed Values: An integer from 1 - 255. The number must be equal to or greater than the value in the **scs-top-margin** attribute. It must be equal to or less than the value in the **scs-maximum-page-length** attribute.

In this example, the data ends on line 61. Because the page has 66 lines, the bottom margin has 5 blank lines:

```
scs-bottom-margin = 61   scs-maximum-page-length=66
```

Default Value: No bottom margin. NetSpool uses the current maximum presentation line (MPL) value.

Usage Guidelines:
- A Set Horizontal Format (SHF) command in the SCS input data stream overrides this value.
- When **scs-bottom-margin=1**, NetSpool does not insert form feeds when the application spaces past the bottom margin; however, NetSpool does insert form feeds when an explicit form feed or a Select Vertical Channel command occurs in the input data.
- NetSpool ignores this attribute if **netspool-formatting = none**.
- IP PrintWay ignores this attribute if **printway-formatting=none** or **vtam-send-as-transparent=yes**.

scs-horizontal-tabs

This **multi-valued**, **list** attribute specifies the column numbers of the default horizontal tab settings. NetSpool uses this value when it converts SNA character string (SCS) data streams to either line data streams or PCL data streams. NetSpool always sets the first tab to the left margin value; you do not need to specify it. NetSpool ignores a value of 0.

Allowed Values: An integer from 0 - 255. A number greater than zero must be equal to or between the values in the **scs-left-margin** and **scs-right-margin** attributes.

In the following example, horizontal tabs are set at columns 6, 25, 50, 75, and 100.

```
scs-horizontal-tabs = {25 50 75 100} scs-left-margin = 6
```

Default Value: NetSpool uses tab value 0.

Usage Guidelines:
- A Set Horizontal Format (SHF) command in the SCS input data stream overrides this value.
- The input data stream can add additional tab positions but cannot remove default tabs set in this attribute.
- NetSpool ignores this attribute if **netspool-formatting = none**.

scs-left-margin
This **single-valued** attribute specifies the number of the first column of data on each page. NetSpool uses this value when it converts SNA character string (SCS) data streams to either line data streams or PCL data streams. IP PrintWay uses this value when it converts line data streams to SCS data streams.

Allowed Values: An integer from 1 - 255. The number must be equal to or less than the value in the **scs-maximum-line-length** attribute.

In this example, the left margin has 3 blank columns:
```
scs-left-margin = 4
```

Default Value: No left margin.

Usage Guidelines:
- A Set Horizontal Format (SHF) command in the SCS input data stream overrides this value.
- NetSpool ignores this attribute if **netspool-formatting = none**.
- IP PrintWay ignores this attribute if **printway-formatting=none** or **vtam-send-as-transparent=yes**.
- When IP PrintWay converts line data to SCS data, the left margin value in the FCB, if specified, overrides this value.

scs-maximum-line-length
This **single-valued** attribute specifies the number of columns to place on one line. This number includes the left and right margins. NetSpool uses this value when it converts SNA character string (SCS) data streams to either line data streams or PCL data streams. IP PrintWay uses this value when it converts line data streams to SCS data streams.

Allowed Values: An integer from 1 - 255.

Default Value: NetSpool uses column number 80 as the default. IP PrintWay uses the printer's default value set on the printer's panel.

Usage Guidelines:
- A Set Horizontal Format (SHF) command in the SCS input data stream overrides this value.
- NetSpool uses this value as the default maximum presentation position (MPP) value.
- NetSpool ignores this attribute if **netspool-formatting = none**.
- IP PrintWay ignores this attribute if **printway-formatting=none** or **vtam-send-as-transparent=yes**.

scs-maximum-page-length
This **single-valued** attribute specifies the number of lines to place on a page. This number includes any blank lines in the top and bottom margins and data lines. NetSpool uses this value when it converts SNA character string (SCS) data streams

to either line data streams or PCL data streams. IP PrintWay uses this value when it converts line data streams to SCS data streams.

Allowed Values: An integer from 1 - 255.

Default Value: NetSpool uses 1 as the default. IP PrintWay uses the printer's default set on the printer panel.

Usage Guidelines:
- A Set Vertical Format (SVF) command in the SCS input data stream overrides this value.
- NetSpool uses this value as the default SCS maximum presentation line (MPL) value.
- NetSpool ignores this attribute if **netspool-formatting = none**.
- IP PrintWay ignores this attribute if **printway-formatting=none** or **vtam-send-as-transparent=yes**.
- When IP PrintWay converts line data to SCS data, the page size value in the FCB, if specified, overrides this value.

scs-right-margin

This **single-valued** attribute specifies the column number at which the right margin starts on each page. NetSpool uses this value when it converts SNA character string (SCS) data streams to either line data streams or PCL data streams. IP PrintWay uses this value when it converts line data streams to SCS data streams.

Allowed Values: An integer from 1 - 255. The number must be equal to or less than the value in the **scs-maximum-line-length** attribute.

In this example, the right margin at column 76; because the line length is 80, the right margin has 5 blank columns:

```
scs-right-margin = 76  scs-maximum-line-length=80
```

Default Value: NetSpool uses 80 as the default value. IP PrintWay does not leave a right margin.

Usage Guidelines:
- A Set Horizontal Format (SHF) command in the SCS input data stream overrides this value.
- NetSpool ignores this attribute if **netspool-formatting = none**.
- IP PrintWay ignores this attribute if **printway-formatting=none** or **vtam-send-as-transparent=yes**.

scs-top-margin

This **single-valued** attribute specifies the number of the first line of data on each page. NetSpool uses this value when it converts SNA character string (SCS) data streams to either line data streams or PCL data streams. IP PrintWay uses this value when it converts line data streams to SCS data streams.

Allowed Values: An integer from 1 - 255. The number must be less than or equal to the value specified in the **scs-maximum-page-length** attribute. In the following example, NetSpool leaves 5 blank lines in the top margin:

```
scs-top-margin = 6
```

Default Value: No top margin.

Usage Guidelines:
- NetSpool also uses this value as the line number for Select Vertical Channel 1.

- A Set Vertical Format (SVF) SCS command in the input data stream overrides this value.
- NetSpool ignores this attribute if **netspool-formatting = none**.
- IP PrintWay ignores this attribute if **printway-formatting=none** or **vtam-send-as-transparent=yes**.

scs-vertical-tabs

This **multi-valued**, **list** attribute specifies the line numbers of the default vertical tab settings. NetSpool uses these values when it converts SNA character string (SCS) data streams to either line data streams or PCL data streams. The first tab is always set to the top margin value; do not specify it. A tab value of 0 is ignored. The first eleven tabs are also used as line numbers for Select Vertical Channel 2 through 12.

Allowed Values: An integer from 0 - 255. A number greater than zero must be equal to or between the values in the **scs-top-margin** and **scs-bottom-margin** attributes.

In the following example, vertical tabs are set at lines 6, 20, 40, and 50; these vertical channels are set: CH01=6, CH02=20, CH04=40, CH05=50; these vertical channels are *not* set: CH03, CH06 through CH12.

```
scs-vertical-tabs = {20 0 40 50} scs-top-margin = 6
```

Default Value: NetSpool uses tab value 0.

Usage Guidelines:
- A Set Vertical Format (SVF) SCS command in the input data stream overrides this value.
- The input data stream can add additional tab positions but cannot remove default tabs set in this attribute.
- NetSpool ignores this attribute if **netspool-formatting = none**.

translation-dataset-qualifier

This **single-valued** attribute specifies the name of the TCP/IP translation table that IP PrintWay uses to convert single-byte character set (SBCS) data from EBCDIC to ASCII. This translation table name is used with both single-byte data and double-byte data to determine the high-level qualifier of the translation table data set. Specify this attribute only if you have created a custom TCP/IP translate table.

Allowed Values: A valid translation table name.

Default Value: See Usage Guidelines.

Usage Guidelines:
- If either the **document-codepage** or **printer-codepage** attribute is specified, IP PrintWay uses the code pages to convert data and ignores this attribute.
- If this attribute, the **db-translate-table** attribute, the **document-codepage**, and the **printer-codepage** attribute are not specified, IP PrintWay uses default code pages to convert data; however, you can specify the **old-style-translation** attribute in the FSS definition to force IP PrintWay to use the standard TCP/IP translate table, STANDARD.TCPXLBIN, to convert data.

Attributes for Protocol Object Class

This section lists attributes that are valid when you create Protocol components, which are in object class **protocol**. These attributes are also valid for the **printer** object class.

Required Attributes

Table 28 summarizes the attributes that are required and optional when you create a printer definition. The required and optional attributes depend on the value you select for the **protocol-type** attribute. You can specify attributes either in the printer definition or in an included Protocol component.

Note: When you create a Protocol component, no attributes are required. When you create a default IP PrintWay printer definition, no attributes are required.

Table 28. Required Protocol Attributes

Value of protocol-type attribute	Required Attributes	Optional Attributes
direct-sockets	printer-ip-address, port-number	none
ipp	printer-uri	none
lpr	printer-ip-address, print-queue-name	lpr-*xxxxx*, owner, server-user-options
vtam	printer-luname	printer-logmode, vtam-checkpoint-pages, vtam-send-as-transparent
e-mail	email-to-address	none

description

This **single-valued** attribute lets you provide a description for the component. The description can help you select the correct component from a list.

Allowed Values: Any combination of 1-256 letters (a-z, A-Z), numbers (0-9), blanks, and special characters (such as # $ @ ! = / -). If the value contains blanks or special characters, enclose it in single or double quotes.

Default Value: None.

email-to-address

This **single-valued** attribute specifies one or more e-mail addresses of the primary e-mail recipients. You can also specify one or more alias names that are defined to z/OS UNIX sendmail; an alias name represents a real e-mail address or a list of addresses. This attribute is required if you create a printer definition with **protocol-type=email**.

Allowed Values: You can specify up to 256 characters; separate multiple addresses and alias names with a comma. Blanks are not allowed. Each address or alias name should be in the format:

username[*@domainname*]

where:

username
> The name of the recipient or an alias name that is defined to z/OS UNIX sendmail.

@domainname
> The domain name of the target system. If you omit *@domainname*, sendmail uses the name of the system on which sendmail is running. If you specify an alias, omit *@domainname*.

| For example:

| `email-to-address="user1@xyz.com,user2@xyz.com,dept01list"`

| **Default Value:** None.

| **Usage Guidelines:** Infoprint Server does not verify that the value is in the correct
| format.

lpr-banner-class

This **single-valued** attribute specifies the class name that IP PrintWay passes to
the remote LPD for printing on a banner page, a page the LPD can print before the
document.

Allowed Values: A combination of 1-31 letters (a-z, A-Z), numbers (0-9), blanks,
and special characters (such as @ $ # , * - /). If the value contains blanks or
special characters, enclose it in single or double quotes.

Default Value: IP PrintWay passes the name of the z/OS system to the LPD.

Usage Guidelines:
- The implementation and configuration of the remote LPD determines how this
  value is used.
- IP PrintWay uses this value only when it uses the LPR to LPD transmission
  protocol and **print-banner-page=yes**.

lpr-banner-job-name

This **single-valued** attribute specifies the job name that IP PrintWay passes to the
remote LPD for printing on a banner page, a page the LPD can print before the
document.

Allowed Values: A combination of 1-99 letters (a-z, A-Z), numbers (0-9), blanks,
and special characters (such as @ $ # , * - /). If the value contains blanks or
special characters, enclose it in single or double quotes.

Default Value: IP PrintWay passes the data set name to the LPD.

Usage Guidelines:
- The implementation and configuration of the remote LPD determines how this
  value is used.
- IP PrintWay uses this value only if it uses the LPR to LPD transmission protocol
  and **print-banner-page=yes**.

lpr-filename

This **single-valued** attribute specifies the file name that IP PrintWay passes to the
remote LPD.

| **Allowed Values:** A combination of 1-31 letters (a-z, A-Z), numbers (0-9), blanks,
| and special characters (such as @ $ # , * - /). If the value contains blanks or
| special characters, enclose it in single or double quotes.

Default Value: IP PrintWay passes the data set name to the LPD.

Usage Guidelines:
- The implementation and configuration of the remote LPD determines how this
  value is used.
- IP PrintWay uses this value only if it uses the LPR to LPD transmission protocol.

• IP PrintWay passes this value to the LPD if the job submitter does not specify another title, the **lpr-title** attribute is not specified, and **lpr-print-function=p**.

lpr-indent

This **single-valued** attribute specifies the number of columns that the remote LPD indents the output it generates.

Allowed Values: An integer from 1 - 2147483646.

Default Value: IP PrintWay does not pass a value to the LPD, so output is not indented.

Usage Guidelines:

• The implementation and configuration of the remote LPD determines how this value is used.
• IP PrintWay uses this value only if it uses the LPR to LPD transmission protocol.

lpr-mode

This **single-valued** attribute specifies the mode that IP PrintWay uses when transmitting data to a remote LPD.

Allowed Values: You can enter one of these fixed values:

control-file-first
IP PrintWay transmits the control file before the data file. Not all LPDs support this mode; however, this mode lets some LPDs print data as it is received and print larger files.

control-file-last
IP PrintWay transmits the control file after the data file. All LPDs that adhere to RFC 1179 support this mode.

streaming IP PrintWay transmits the control file before the data file. The remote LPD must support the RECEIVE CONTROL FILE FIRST and RECEIVE DATA FILE WITH UNSPECIFIED LENGTH commands. Specify this value if the target system is an IBM network station.

to-remote-psf IP PrintWay transmits files to Infoprint Manager for AIX or Infoprint Manager for Windows on the remote system. IP PrintWay does the following:

- • Adds a record length field to each record.
- • Creates **-o** parameters in the control file. **-o** parameters contain AFP values specified by the job submitter, such as duplex option.
- • Does not format or translate the data file to ASCII. (IP PrintWay ignores the **printway-formatting** attribute.)
- • Transmits the control file after the data file.

Default Value: IP PrintWay transmits the control file after the data file.

lpr-optimize-copies

This **single-valued** attribute indicates how IP PrintWay is to transmit documents when the job submitter requests multiple copies.

Allowed Values: You can enter one of these fixed values:

yes IP PrintWay transmits the document to the LPD only one time. IP PrintWay tells the LPD how many copies to print in the LPD control file.

no   IP PrintWay transmits the document to the LPD multiple times, one time for each copy.

Default Value: IP PrintWay does not optimize the transmission of copies.

Usage Guidelines:
- Select this field to improve performance, but only if the printer's LPD supports printing multiple copies of one file.
- When **lpr-mode=to-remote-psf**, IP PrintWay ignores this attribute and transmits documents only one time because PSF supports printing multiple copies of one file.
- IP PrintWay uses this value only if it uses the LPR to LPD transmission protocol.

lpr-print-banner

This **single-valued** attribute indicates whether the remote LPD is to print a banner page. When **lpr-print-banner=yes**, IP PrintWay sends information for printing on the banner page to the LPD. A banner page is a page the LPD can print before the document.

Allowed Values: You can enter one of these fixed values:

yes   The LPD prints a banner page.

no   The LPD does not print a banner page.

Default Value: The LPD prints a banner page.

Usage Guidelines:
- The implementation and configuration of the remote LPD determines how this value is used.
- IP PrintWay uses this value only if it uses the LPR to LPD transmission protocol.

lpr-print-function

This **single-valued** attribute specifies a code that tells the remote LPD what type of data formatting to perform.

Allowed Values: An upper or lowercase letter. The following codes usually have these meanings:

Code	Meaning
f	Print as a sequence of lines.
l	Print leaving control characters.
p	Print with pagination.
r	Print interpreting the first column as FORTRAN (ANSI) carriage control characters. Supported characters are 1, 0, +, -, and blank.

Default Value: IP PrintWay passes code **f** to the remote LPD.

Usage Guidelines:
- Some LPDs require that you specify code **l** for data that is not to be formatted or that includes transparent data.
- The implementation and configuration of the remote LPD determines how this value is used.
- IP PrintWay uses this value only if it uses the LPR to LPD transmission protocol.

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lpr-restrict-ports

This **single-valued** attribute indicates whether IP PrintWay must use a z/OS port in the range of 721 to 731 when communicating with the remote LPD. Specify **restrict-ports=yes** when the remote LPD enforces this port restriction.

Allowed Values: You can enter one of these fixed values:

yes   The z/OS port must be in the range of 721 to 731.

no   Any z/OS port can be used.

Default Value: IP PrintWay uses any z/OS port.

Usage Guidelines:

- When **restrict-ports=no**, IP PrintWay can use any free port. This increases the probability of finding an available port.
- IP PrintWay uses this value only if it uses the LPR to LPD transmission protocol.

lpr-title

This **single-valued** attribute specifies a document title that IP PrintWay passes to the remote LPD.

Allowed Values: A combination of 1-79 letters (a-z, A-Z), numbers (0-9), blanks, and special characters (such as @ $ # , * - /). If the value contains blanks or special characters, enclose it in single or double quotes.

Default Value: If **lpr-print-function=p**, IP PrintWay transmits the value in the **lpr-title** attribute to the LPD; if the **lpr-filename** attribute is not specified, IP PrintWay transmits the data set name.

Usage Guidelines:

- The implementation and configuration of the remote LPD determines how this value is used.
- IP PrintWay uses this value only if it uses the LPR to LPD transmission protocol.
- A title specified by the job submitter overrides the value specified in this attribute.

lpr-width

This **single-valued** attribute specifies the maximum number of columns that the remote LPD puts on a line.

Allowed Values: An integer from 1 - 2147483646.

Default Value: IP PrintWay does not pass a width value to the LPD.

Usage Guidelines:

- The implementation and configuration of the remote LPD determines how this value is used.
- IP PrintWay uses this value only if it uses the LPR to LPD transmission protocol.

name

This **single-valued** attribute specifies the name of the component.

Note: This is a *non-settable* attribute. Do *not* specify the **name** attribute on the PIDU **create**, **force-create**, or **modify** command; instead, specify the name as an operand on the command. However, you can specify the **name** attribute when you construct a condition for the **where** predicate on the **list** and **export** commands.

Allowed Values: Any combination of 1-17 letters (a-z, A-Z), numbers (0-9), and special characters (such as $ # @ . - = /). Blank characters are not allowed.

Default Value: None.

owner
This **single-valued** attribute specifies the owner name that IP PrintWay passes to the remote LPD for printing on the banner page, a page printed before the document.

Allowed Values: A combination of 1-31 letters (a-z, A-Z), numbers (0-9), blanks, and special characters (such as: @ $ # , * - /). If the value contains blanks or special characters, enclose it in single or double quotes.

Default Value: IP PrintWay passes the user ID for the print job to the LPD.

Usage Guidelines:
* The implementation and configuration of the remote LPD determines how this value is used.
* IP PrintWay uses this value only if it uses the LPR to LPD transmission protocol and **lpr-print-banner=yes**.

port-number
This **single-valued** attribute specifies the port number of the remote printer or print server.

Allowed Values: Specify the port number (1–65545) that is configured in the printer.

Default Value: None.

Usage Guidelines:
* This attribute is required if you create a printer definition and **protocol-type=direct-sockets**. For other protocol types, IP PrintWay ignores this attribute.
* A port number specified by the job submitter overrides this attribute.
* In the IP PrintWay default printer definition named DFLTNTRY, omit this attribute because IP PrintWay uses the port number specified on the OUTPUT JCL statement.

print-queue-name
This **single-valued** attribute specifies the name of the print queue in the remote printer or print server. Specify this attribute if you specify LPR to LPD protocol in the **protocol-type** attribute.

Allowed Values: A combination of 1-255 letters (a-z, A-Z), numbers (0-9), and special characters (such as # $ @ ! = / -). Blanks are not allowed. The print queue name is case sensitive on some remote systems, so be sure to use the correct uppercase and lowercase letters.

Default Value: None.

Usage Guidelines:
* This attribute is required if you create a printer definition and **protocol-type=lpr**. For other protocol types, IP PrintWay ignores this attribute.
* A print queue name specified by the job submitter overrides this value.

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- In the IP PrintWay default printer definition named DFLTNTRY, omit this attribute because IP PrintWay uses the print queue name specified on the OUTPUT JCL statement.

printer-ip-address

This **single-valued** attribute specifies the Internet Protocol (IP) address or host name of the remote printer or print server.

Allowed Values: Specify the IP address in dotted-decimal format (nnnn.nnnn.nnnn.nnnn), or specify the host name in place of the dotted-decimal address. Blanks are not allowed. If the value contains special characters, enclose it in quotes.

Default Value: None.

Usage Guidelines:

- An IP address specified by the job submitter overrides this attribute.
- If another printer definition refers to this printer, use the same uppercase and lowercase letters when you type the IP address.
- This attribute is required when you create a printer definition and specify either **lpr** or **direct-sockets** in the **protocol-type** attribute. For other protocol types, IP PrintWay ignores this attribute.
- In the IP PrintWay default printer definition named DFLTNTRY, you can omit this attribute because the job submitter must specify an IP address.

printer-logmode

This **single-valued** attribute specifies the name of an entry in the VTAM logon-mode table, which defines the session parameters for a printer.

Allowed Values: You can enter a valid combination of 1–8 letters, numbers, and special characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. If a value contains special characters, enclose the value in quotes. Lowercase letters are converted to uppercase.

Default Value: The name specified in the DLOGMOD parameter of the VTAM resource definition statement for the printer is used.

Usage Guidelines: IP PrintWay uses this value only if **protocol-type=vtam**.

printer-luname

This **single-valued** attribute specifies the VTAM network name of the printer. This name must match the name of the VTAM resource definition for the printer, for example the VTAM LU or LOCAL definition. LU type 0 (DSC/DSE), LU type 1 (SCS) and LU type 3 (DSC/DSE) printers are supported.

Allowed Values: You can enter a valid combination of 1–8 letters, numbers, and special characters (# $ @). The first character cannot be numeric. Blanks and other special characters are not allowed. If a value contains special characters, enclose the value in quotes. Lowercase letters are converted to uppercase.

Default Value: None.

Usage Guidelines: This attribute is required if you create a printer definition and **protocol-type=vtam**. For other protocol types, IP PrintWay ignores this attribute.

printer-uri

This **single-valued** attribute specifies the uniform resource indicator (URI) of the remote Internet Printing Protocol (IPP) server running either in a printer or host system. This attribute is required if you create a printer definition and **protocol-type=ipp**.

Allowed Values: A combination of letters, numbers, and special characters, as defined by RFC 2396. Blanks are not allowed. If the value contains special characters, enclose it in quotes. Examples of URIs are:

```
printer-uri=ipp:"//myhost/ippserv/myprintq"
printer-uri=http:"//host1:631/webserv/ippserv/myprintq"
```

Default Value: None.

Usage Guidelines:
- For URIs prefixed with **ipp**, the default port is 631.
- If you specify this URI in another printer definition, type the same uppercase and lowercase letters in each printer definition.

protocol-type

This **single-valued** attribute specifies the transmission protocol you want IP PrintWay to use to transmit data sets to the remote system.

Allowed Values: You can enter one of these fixed values:

direct-sockets
>> TCP/IP socket to socket protocol.

email   TCP/IP Simple Mail Transfer Protocol (SMTP)

ipp   Internet Printing Protocol (IPP). An IPP server must be running in the remote printer or server.

lpr   TCP/IP line printer (LPR) to line printer daemon (LPD) protocol. An LPD must be running in the remote printer or print server and listening at port 515.

vtam   Virtual Telecommunications Access Method (VTAM). The printer must be a VTAM LU type 0 (DSC/DSE), LU type 1 (SCS), or LU type 3 (DSC/DSE).

Default Value: **protocol-type=lpr**

Usage Guidelines:
- If you specify **direct-sockets**, also specify the **printer-ip-address** and **port-number** attributes.
- If you specify **email**, also specify the **email-to-address** attribute.
- If you specify **ipp**, also specify the **printer-uri** attribute.
- If you specify **lpr**, also specify the **printer-ip-address** and **print-queue-name** attributes.
- If you specify **vtam**, also specify the **printer-luname** attribute.

server-user-options

This **single-valued** attribute specifies information that IP PrintWay sends to the remote LPD. You can specify options that the remote LPD supports but that IP PrintWay does not automatically generate.

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Allowed Values: A combination of 1-255 letters (a-z, A-Z), numbers (0-9), blanks, and special characters (such as @ $ # , * - /). If the value contains blanks or special characters, enclose it in single or double quotes.

Default Value: None.

Usage Guidelines: IP PrintWay ignores this attribute when it uses the direct sockets, IPP, or VTAM transmission protocol.

vtam-checkpoint-pages

This **single-valued** attribute specifies the number of pages between data-set checkpoints. IP PrintWay requests a definitive response from the printer after the specified number of pages. If a recoverable printer error or printer intervention situation occurs, IP PrintWay resends the pages sent since the last definitive response to the printer. This ensures that no data is lost; however, duplicate pages, up to the number specified in this attribute, might be printed.

Allowed Values: An integer from 0 - 25.

Default Value: IP PrintWay uses 5.

Usage Guidelines:

- 0 means that IP PrintWay takes no checkpoints. If 0 is specified and an error occurs, IP PrintWay retransmits the entire data set if you requested retries in the printer definition. See the **retry-limit** and **retry-time** attributes for information about how to specify retries.
- This attribute is used only if **protocol-type=vtam**. For other protocol types, IP PrintWay ignores this attribute.
- If you request too frequent checkpoints, printer performance can be adversely affected.
- If you request infrequent checkpoints, more duplicate pages might be printed.

vtam-send-as-transparent

This **single-valued** attribute indicates that IP PrintWay sends output data to the printer as transparent data. IP PrintWay precedes data with transparent data controls but does not convert data to SCS or DSC/DSE format.

Allowed Values: You can enter one of these fixed values:

yes IP PrintWay transmits data as transparent data.

no IP PrintWay does not transmit data as transparent data.

Default Value: IP PrintWay does not transmit data as transparent data.

Usage Notes:

- IP PrintWay uses this attribute only if **protocol-type=vtam**. For other protocols, IP PrintWay ignores this attribute.
- Specify **vtam-send-as-transparent=yes** if data is already in a format that the printer accepts and if the SNA gateway requires that data be sent as transparent data.
- You can specify the character that IP PrintWay uses in the transparent data controls in the **transparent-data-character** attribute.
- IP PrintWay does *not* transmit the following types of data as transparent data:
  - Data specified in the **document-header** and **document-trailer** attributes
  - Data added by the IP PrintWay Begin Data Set and End Data Set exits

| • When **vtam-send-as-transparent=yes**, IP PrintWay ignores the
| **printway-formatting** attribute and processes data as if **printway-
| formatting=none**.

Attributes for PSF for OS/390 FSS Object Class

This section lists attributes that are valid when you create PSF for OS/390 FSS definitions, which are in object class **psf-fss**.

Note: If you change the value for an attribute, you must restart the FSS to pick up the new value.

Required Attributes
All attributes are optional.

description
This **single-valued** attribute describes the FSS definition. The description can help you select the FSS definition from a list.

Allowed Values: Any combination of 1–256 letters (a-z, A-Z), numbers (0-9), blanks, and special characters (such as # $ @ ! = / -). If the value contains blanks or special characters, enclose the value in quotes.

Default Value: None.

name
This **single-valued** attribute specifies the name of the FSS definition.

Note: This is a *non-settable* attribute. Do *not* specify the **name** attribute on the PIDU **create**, **force-create**, or **modify** command; instead, specify the name as an operand on the command. However, you can specify the **name** attribute when you construct a condition for the **where** predicate on the **list** and **export** commands.

Allowed Values: None.

Default Value: None.

nst-trace-dsname
This **single-valued** attribute specifies the name of the data set that PSF directs a notify subtask (NST) trace to. This name must be different than the data set name PSF directs an FSA external trace to. For complete details about this attribute, refer to *PSF for OS/390 & z/OS: Diagnosis*.

Allowed Values: You can enter a valid data set name.

Default Value: None.

Usage Guidelines: An NST trace is recorded only if an FSA internal or external trace of the page printing writer (PPWTR) component is also active for that FSA.

tcpip-job-name
This **single-valued** attribute specifies the name of the TCP/IP startup procedure. If you have changed the name of the TCP/IP startup procedure, specify the new name for this attribute. For complete details about this attribute, refer to *PSF for OS/390 & z/OS: Diagnosis*.

psf-fss

> *Allowed Values:* You can enter a valid job name. The letters you type are converted to uppercase.
>
> *Default Value:* TCPIP

trace-prompt

This **single-valued** attribute specifies whether the operator is prompted with message APS620A each time the FSS starts. Prompting lets the operator start tracing all FSAs before the FSA starts processing any data sets. For complete details about this attribute, refer to *PSF for OS/390 & z/OS: Diagnosis*.

Allowed Values: You can enter one of these fixed values:

yes The operator is prompted when the FSS starts.

no The operator is not prompted.

Default Value: no

trace-table-size

This **single-valued** attribute specifies a number that indicates how many 4 KB pages of storage are allocated for the PSF FSA trace table. This allocation occurs only if the **trace-mode** attribute is **internal**, **ipds**, **limit**, **full**, or **sync**. For complete details about this attribute, refer to *PSF for OS/390 & z/OS: Diagnosis*.

Allowed Values: You can enter an integer from 1 to 999.

Default Value: 32

Chapter 18. Using Accounting Information in SMF Type 6 Records

IP PrintWay and PSF for OS/390 both write SMF type 6 records. The SMF type 6 record that IP PrintWay and PSF write for data sets that Print Interface or NetSpool have allocated on the JES spool contain the values shown in the following table. The contents of the fields vary according to how the print job was submitted.

If the print request was submitted in this way:	The contents of these SMF type 6 record fields are:		
	SMF6JBNM	SMF6JBID	SMF6USID
z/OS UNIX **lp** command or AOPPRINT JCL procedure	User ID of the job submitter[1]	Infoprint Server job ID[2]	User ID of the job submitter
Batch job using a DD JCL statement[3]	Job name of the z/OS batch job	z/OS job ID assigned to data set[4]	• **SMF record written by IP PrintWay:** User ID of the job submitter • **SMF record written by PSF:** User ID of the user who started Infoprint Server daemons
Print command or application on a remote system[5]	Name of the remote job submitter [6]	Infoprint Server job ID[2]	User ID of the user who started the Infoprint Server daemon that allocated the data set on the JES spool
VTAM applications, such as CICS and IMS applications	Member name of the NetSpool startup procedure	z/OS job ID	User ID of the user assigned to the NetSpool started task

1. The job submitter can specify any job name in the **sysout-job-name** job attribute.

2. The Infoprint Server job ID starts with the 2–character prefix that is defined in the Infoprint Server configuration file, **aopd.conf**. The default prefix is PS.

3. Infoprint Server allocates the data set on the JES spool when (1) the job submitter uses the Print Interface subsystem and (2) IP PrintWay sends data sets to the Print Interface LPD, a situation that can occur when the resubmit for filtering option is selected in the printer definition.

   In the second SMF type 6 record that IP PrintWay writes for a data set when the resubmit for filtering option is selected, the job name and user ID in the two records are the same; however, the job ID is not the same.

4. This job ID is not the same as the job ID that z/OS assigns to the job.

5. Print commands include the **lpr**, **enq**, **lp**, and **print** commands. Job submitters can also print from a remote system using SAP R/3 or a standard Windows print submission method.

6. If the document was submitted with an **lpr** command, this is the user ID specified in the P control code in the LPD control file. If the user ID is unknown, the job name might contain UNKNOWN or ANONYMOU. A # in the name indicates that the name contains a character that JES does not allow.

SMF Type 6 Record Written by IP PrintWay

The IP PrintWay component of Infoprint Server writes a System Management Facilities (SMF) type 6 record before deleting a data set from the JES spool and before releasing a data set back to the system (JES). Usually, IP PrintWay writes only one SMF type 6 record for each data set it processes; however, in the following situations, IP PrintWay writes *two* SMF records for one output data set transmitted to the target destination:

• IP PrintWay restarts a data set that IP PrintWay had previously released back to the system.

In this case, IP PrintWay writes one SMF record when it releases the data set back to the system and writes another when it deletes the data set from the JES spool.

- IP PrintWay resubmits the data set to Print Interface for processing because the **Resubmit for filtering** field is selected in the printer definition.

  In this case, IP PrintWay writes one SMF record when it deletes the original data set from the JES spool and writes another when it deletes the output data set allocated by Print Interface. See "Resubmitting Documents to Print Interface for Filtering" on page 191 if you need more information about how IP PrintWay resubmits a data set to Print Interface.

Note: You can write an IP PrintWay SMF exit to modify or suppress the SMF record. For example, if IP PrintWay writes two records for an output data set that it submits to Print Interface, you might want to suppress the first SMF record. Refer to *z/OS Infoprint Server Customization* for information about the SMF exit.

IP PrintWay writes the following SMF type-6 sections:
- Header/Self-Defining section
- I/O Data section
- Common section
- Enhanced SYSOUT Support (ESS) section
- File Transfer section

The following sections in this chapter describe some of the fields in the Header/Self-Defining, I/O Data, and File Transfer sections that are of particular interest. Refer to *z/OS MVS System Management Facilities (SMF)* for the complete format of the SMF type-6 record that IP PrintWay writes.

Header/Self-defining Section

Field SMF6PAD1 indicates whether the File Transfer section is present. Field SMF6SBS indicates that the SMF record was written by IP PrintWay.

Table 29. SMF Type-6 Record—Header/Self-defining Section

Offsets		Name	Length	Format	Description	
61	3D	SMFPAD1	1	binary	**Bit**	**Meaning When Set**
					0	Reserved
					1	Common section present
					2	Reserved
					3	Enhanced SYSOUT support section present
					4	File Transfer section present
					5-7	Reserved
62	3E	SMF6SBS	2	binary	Subsystem Identification—X'0009' signifies IP PrintWay.	

Note: IP PrintWay calculates the number of records read in field SMF6NLR in the same way as it calculates the number of bytes transmitted. See the description of SMF6BYTE in Table 31 on page 359.

I/O Data Section

Field SMF6DCI indicates the status of the transmission attempt. Field SMF6PGE is not used; it does not contain a page count.

Table 30. SMF Type-6 Record—I/O Data Section

Offsets		Name	Length	Format	Description	
02	02	SMF6DCI	1	binary	**Bit**	**Name-Meaning When Set**
					0	SMF6DCRV-Transmission attempted
					1	SMF6SDS-Transmission successful
					2	Reserved
					3	SMF6ORD-Data set released to the system with checkpoint
					4	SMF6OR-Data set restarted using checkpoint information
					5-7	Reserved
24	18	SMF6PGE	4		Unused	

File Transfer Section

The fields in this record identify the target system and the number of bytes transmitted to the target system. You can use SMF macro IFASMFR to map the File Transfer section.

Table 31. SMF Type-6 Record—File Transfer Section

Offsets		Name	Length	Format	Description
0	0	SMF6LN6	2	binary	Length of the File Transfer section, including this field
2	2	SMF6BYTE	4	binary	Total number of bytes transmitted [1]
6	6	SMF6IP1	1	binary	First segment of the IP address of the target printer. [2]
7	7	SMF6IP2	1	binary	Second segment of the IP address of the target printer. [2]
8	8	SMF6IP3	1	binary	Third segment of the IP address of the target printer. [2]
9	9	SMF6IP4	1	binary	Fourth segment of the IP address of the target printer. [2]
10	A		12		Reserved
22	16	SMF6PQLN	2	binary	Length of the print queue name. This field contains zero if PrintWay did not transmit the data to an LPD print queue.
24	18	SMF6PRTQ	variable	EBCDIC	Name of the print queue on the target system

Table 31. SMF Type-6 Record—File Transfer Section (continued)

Offsets	Name	Length	Format	Description

Notes:

1. If IP PrintWay attempted to transmit the data set to the printer, field SMF6BYTE contains the number of bytes IP PrintWay transmitted or attempted to transmit. If IP PrintWay attempted to transmit the data set more than once, this field contains the *total* number of bytes in all transmission attempts, including the number of bytes in the successful transmission. When IP PrintWay writes a record for a data set that it restarted, field SMF6BYTE contains only the number of bytes transmitted after IP PrintWay restarted the data set.

2. The contents of this field are unpredictable if IP PrintWay transmitted the data to an IPP server, a VTAM-controlled printer, or to an e-mail destination.

Part 4. Appendixes

Appendix A. Printer Attribute Tables

Allocation Attributes and Corresponding OUTPUT or DD Statement Parameters

This table lists the attributes you can specify in the Allocation section of a printer definition or in an Allocation component. For each attribute, the ISPF field name is listed and the corresponding parameter on an OUTPUT or DD JCL statement. When you specify a value in a field, Print Interface and NetSpool allocate data sets on the JES spool using the OUTPUT or DD statement parameter that corresponds to the field.

Table 32. Attributes Used for Job Allocation and the Corresponding OUTPUT Parameters

Field Name	OUTPUT (or DD statement) Parameter
Address	ADDRESS
Building	BUILDING

BURST
   Yes
   No
	BURST
	   YES
	   NO

Character sets	CHARS
Checkpoint pages	CKPTPAGE
Checkpoint seconds	CKPTSEC
CLASS	CLASS
Color map	COLORMAP
Com setup member	COMSETUP
Copies[1]	COPIES *nnn*
Copy group	COPIES *group-value*
Department	DEPT
DEST	DEST *userid*

Duplex
   Simplex
   Duplex
   Tumble
	DUPLEX
	   NO
	   YES
	   TUMBLE

Error disposition
   Default
   Hold
   Quit
	PRTERROR
	   DEFAULT
	   HOLD
	   QUIT

FCB	FCB

FLASH
   FLASH count
   FLASH name
	
	   FLASH *count*
	   FLASH *overlay-name*

Form definition	FORMDEF
FORMS	FORMS
GROUP ID	GROUPID

HOLD
   Yes
   No
	HOLD (DD statement)
	   YES
	   NO

Table 32. Attributes Used for Job Allocation and the Corresponding OUTPUT Parameters (continued)

Field Name	OUTPUT (or DD statement) Parameter
Image shift	
x-direction front	OFFSETXF
y-direction front	OFFSETYF
x-direction back	OFFSETXB
y-direction back	OFFSETYB
Input tray	INTRAY
JES form length	FORMLEN
JES node	DEST *nodename*
Label data pages	DPAGELBL
Yes	YES
No	NO
LINECT	LINECT
Name	NAME
Notify	NOTIFY *userid*
at node	*node*
OUTDISP	OUTDISP
Purge	PURGE
Leave	LEAVE
Keep	KEEP
Hold	HOLD
Write	WRITE
Output bin	OUTBIN
Overlay	
Back	OVERLAYB
Front	OVERLAYF
Page definition	PAGEDEF
Print error messages	PIMSG
Y	YES
N	NO
Maximum messages	*msg-count*
Print error reporting	DATACK
None	BLOCK
All	UNBLOCK
Character	BLKPOS
Position	BLKCHAR
PRMODE	PRMODE
PRTY	PRTY
Resolution	RESFMT
Resource library	USERLIB
Restrict printable area	SYSAREA
Yes	YES
No	NO
Room	ROOM
SEGMENT	SEGMENT (DD statement)
Table reference characters	TRC
THRESHOLD	THRESHLD

Table 32. Attributes Used for Job Allocation and the Corresponding OUTPUT Parameters (continued)

Field Name	OUTPUT (or DD statement) Parameter
Title	TITLE
UCS	UCS
USERDATA	USERDATA
WRITER	WRITER

[1]The **copies** attribute lets you specify a maximum of 32640 copies for print requests processed by Print Interface, while the COPIES JCL parameter lets you specify a maximum of 255 copies.

Printer Attributes Used by Print Interface

This table lists the attributes that Print Interface uses in each section of a printer definition. For each attribute, the table lists the ISPF panel field name and whether the attribute is required or optional. Use this table to determine which printer attributes to specify when you configure a printer definition for use by Print Interface. Print Interface ignores all fields that are not listed in this table.

Table 33. Printer Definition Fields Used by Print Interface

Section of Printer Definition	Field Name	Condition	Notes
Main section	Printer definition name	Required	
	Description	Optional	This value can help a user select the correct printer.
	Location	Optional	This value can help a user select the correct printer.
Allocation	Spool allocation values	Required	Specify the JES work-selection values for the program that processes output data sets on the JES spool, for example, IP PrintWay or PSF for OS/390. See Table 32 on page 363 for a list of all fields in the Allocation section.
	All other fields	Optional	
Processing	Document code page	Optional	Leave this field blank if you want Print Interface to determine the default dynamically.
	Printer code page	Optional, but recommended	Specify an ASCII or EBCDIC code page.
	Data format	Required	Select at least one data format.
	Filter	Optional	IBM recommends that you specify **aopfiltr.so** for text data in an IP PrintWay printer definition.
	Maximum document size	Optional	If not specified, no limit is enforced for document size.
	Maximum copies	Optional	If not specified, no limit is enforced.
	Forms supported	Optional	If not specified, all forms are allowed on the **lp** command.
	Duplex supported	Optional	
	Print-error reporting supported	Optional	
	Input tray name, Number	Optional	If not specified, **input-tray-name** job attribute is not supported.
	Output bin name, Number	Optional	If not specified, **output-bin-name** job attribute is not supported.

Printer Attributes Used by NetSpool

This table lists the attributes that NetSpool uses in each section of a printer definition. For each attribute, the table lists the ISPF panel field name and whether the attribute is required or optional. Use this table to determine which printer attributes to specify when you configure a printer definition for use by NetSpool. NetSpool ignores all fields that are not listed in this table.

Table 34. Printer Definition Fields Used by NetSpool

Section of Printer Definition	Field Name	Condition	Notes
Main section	Printer definition name	Required	
	Description	Optional	NetSpool does not use this field; however, this field can help you manage your printer definitions.
	Location	Optional	NetSpool does not use this field; however, this field can help you manage your printer definitions.
	NetSpool LU name	Required	
	LU classes	Optional	Default is class 1
Allocation	Spool allocation values:	Required	Specify the JES work-selection values for the program that processes the output data sets on the JES spool, for example, IP PrintWay or PSF for OS/390. See Table 32 on page 363 for a list of all fields in the Allocation section.
Allocation	All other fields	Optional	
Processing	Document code page	Optional	Used only when formatting option is **Convert to PCL**
	Printer code page	Optional	Used only when formatting option is **Convert to PCL**

	SCS Conversion:
	   Margins: Top
	   Margins: Bottom
	   Margins: Left
	   Margins: Right
	   Line length
	   Page length
		Optional	Default values are:
			   Margins: Top = 1
			   Margins: Bottom = 1
			   Margins: Left = 1
			   Margins: Right = 80
			   Line length = 80
			   Page length = 1

Processing	NetSpool PCL Conversion:
	   Print density
	   Line density
	   Orientation
	   SCS automatic page orientation
		Optional	No default values. Used only when formatting option is **Convert to PCL**

NetSpool Options	Formatting	Optional	Default is **Convert to line**
	Record Size	Optional	Applies to formatting option **None**
	RECFM	Optional	Applies to formatting option **None**

Table 34. Printer Definition Fields Used by NetSpool (continued)

Section of Printer Definition	Field Name	Condition	Notes
NetSpool End-of-File Rules	All fields	Optional	Default rule is end-of-bracket for all PLU names and LU types.

Printer Attributes Used by IP PrintWay

This table lists the attributes that IP PrintWay uses in each section or component of a printer definition. For each attribute, the table lists the ISPF panel field name and whether the attribute is required or optional. Use this table to determine which printer attributes to specify when you configure a printer definition for use by IP PrintWay. IP PrintWay ignores all fields that are not listed in this table.

Table 35. Printer Attributes Used by IP PrintWay

Section of Printer Definition	ISPF Field Name	Condition	Notes
Main section	Printer definition name	Required	
	Description	Optional	IP PrintWay does not use this field, but this field can help you manage your printer definitions.
	Location	Optional	IP PrintWay does not use this field, but this field can help you manage your printer definitions.
	Use DEST, CLASS, and FORMS for IP PrintWay printer selection	Optional	
Allocation	CLASS DEST FORMS	(see note)	If **Use DEST, CLASS, and FORMS for IP PrintWay Printer Selection** is selected, **CLASS**, **DEST**, or **FORMS** is required.
	Values for Separator Pages	Optional	Can be used by IP PrintWay exits when Print Interface or NetSpool allocates the output data set on the JES spool.
	FCB	Optional	Used only when Print Interface or NetSpool allocates the output data set on the JES spool.
	Notify	Optional	Used only when Print Interface or NetSpool allocates the output data set on the JES spool.
	Copies	Optional	Used only when Print Interface or NetSpool allocates the output data set on the JES spool.
Processing	Document code page	Optional	
	Printer code page	Optional	
	Resubmit for filtering	Optional	If this field is selected, **Data format** is required, and the following fields are optional: • **Filter** • **Maximum document size** • **Forms supported** • **Duplex supported** • **Print-error reporting supported**
	IP PrintWay Pagination	Optional	Not used if protocol is **VTAM**.
	Pagination		
	Margins: Top		Not used if protocol is **VTAM**.

Table 35. Printer Attributes Used by IP PrintWay (continued)

Section of Printer Definition	ISPF Field Name	Condition	Notes
	Margins: Bottom		
	Page height		
	Print page header		
	Maximum document size	Optional	Not used if protocol is **VTAM**.
	Maximum copies	Optional	Not used if protocol is **VTAM**.
	SOSI mode	Optional	Not used if protocol is **VTAM**.
	Translation dataset qualifier	Optional	Not used if protocol is **VTAM**.
	Double-byte translate table	Optional	Not used if protocol is **VTAM**.
	SCS Conversion	Optional	Used only if protocol is **VTAM**.
IP PrintWay Options	All fields	Optional	
Protocol	Protocol	Required	Displayed only in the Protocol component.
	IP address	(see note)	Required if protocol is **LPR** or **Direct sockets**.
	Print queue name	(see note)	Required if protocol is **LPR**.
	Port number	(see note)	Required if protocol is **Direct sockets**.
	URL	(see note)	Required if protocol is **IPP**.
	Printer LU name	(see note)	Required if protocol is **VTAM**.
	E-mail addresses	(see note)	Required if protocol is **E-mail**.
	LPR processing options:		Used only if protocol is **LPR**.
	Optimize copies	Optional	
	Mode	Optional	
	Restrict ports	Optional	
	Print banner page	Optional	
	Banner class	Optional	
	Banner jobname	Optional	
	Filename	Optional	
	Indent	Optional	
	Owner	Optional	
	Print function	Optional	
	Title	Optional	
	Width	Optional	
	User options	Optional	
	VTAM processing options:		Used only if protocol is **VTAM**.
	Printer logmode	Optional	
	Checkpoint pages	Optional	

Table 35. Printer Attributes Used by IP PrintWay (continued)

Section of Printer Definition	ISPF Field Name	Condition	Notes
	Send as transparent data	Optional	

Printer Attributes Used by AFP to PCL, AFP to PDF, and AFP to PostScript Transforms

This table lists the attributes that the AFP to PCL, AFP to PDF, and AFP to PostScript transforms use in each section of a printer definition. For each attribute, the table lists the ISPF panel field name and whether the attribute is required or optional. Use this table to determine which printer attributes to specify. These tranforms ignore all fields that are not listed in this table.

Table 36. Printer Attributes Used by AFP to PCL, AFP to PDF, and AFP to PostScript Transforms

Section of Printer Definition	ISPF Field Name	Condition	Notes
Allocation	Character sets	Optional	Leave blank to use the default in the transform configuration file.
	Duplex	Optional	Leave blank to use the value in the form definition.
	Form definition	Optional	Leave blank to use the first inline form definition or the default in the transform configuration file.
	Image shift x-direction back	Optional	Leave blank to use the value in the form definition.
	Image shift x-direction front	Optional	Leave blank to use the value in the form definition.
	Image shift y-direction back	Optional	Leave blank to use the value in the form definition.
	Image shift y-direction front	Optional	Leave blank to use the value in the form definition.
	Input tray	Optional	Leave blank to use the value in the form definition.
	Output bin	Optional	Leave blank to use the value in the form definition.
	Overlay back	Optional	
	Overlay front	Optional	
	Page definition	Optional	Leave blank to use the first inline page definition or the default in the transform configuration file.
	Resource library	Optional	Leave blank to use only the libraries in the form definition.
	Table reference characters	Optional	
Processing	Carriage control type	Optional	Leave blank to let Print Interface determine the carriage control type.
	Data format	Required	Select **MO:DCA-P** or **line data**
	Filter	Required	

Appendix B. ISPF Panels

This appendix shows some of the Infoprint Server ISPF panels.

Main ISPF Panel for IP PrintWay Printer Definition

The following screen shows the first ISPF panel you use to create an IP PrintWay printer definition.

```
                        IP PrintWay Printer Definition

Printer definition name . _____
Description . _____ (extend)
Location. . . _____ (extend)

                         Component name        Custom values
Section                 (enter to list)     (enter to customize)
Allocation          => _____        => __
Processing          => _____        => *
NetSpool options    => _____        => __
NetSpool end-of-file => _____        => __
IP PrintWay options => _____        => __
Protocol            => _____        => *

_ Use DEST, CLASS, and FORMS for IP PrintWay printer selection
NetSpool LU name . _____    LU classes . . __  __  __  __  __  __   (extend)
```

Main ISPF Panel for PSF for OS/390 Printer Definition

The following screen shows the first ISPF panel you use to create a PSF for OS/390 printer definition.

```
                        PSF for OS/390 Printer Definition

Printer definition name . _____
Description . _____ (extend)
Location. . . _____ (extend)

                         Component name        Custom values
Section                 (enter to list)     (enter to customize)
Allocation          => _____        => __
Processing          => _____        => *
NetSpool options    => _____        => __
NetSpool end-of-file => _____        => __

NetSpool LU name . _____    LU classes . . __  __  __  __  __  __   (extend)
```

Main ISPF Panel for a General OS/390 Printer Definition

The following screen shows the first ISPF panel you use to create a General printer definition.

```
                        General Printer Definition

Printer definition name . _____
Description . _____ (extend)
Location. . . _____ (extend)


                        Component name      Custom values
Section                 (enter to list)     (enter to customize)
Allocation          => _____         => __
Processing          => _____         => *
NetSpool options    => _____         => __
NetSpool end-of-file => _____         => __
IP PrintWay options => _____         => __

NetSpool LU name . _____    LU classes . . __  __  __  __  __  __   (extend)
Spooling mode. . . _    1. Line  2. Stream
```

ISPF Panel for Allocation Section or Component

The following screen shows the ISPF panel you use to fill in the Allocation section of a printer definition or to create an Allocation component.

```
                              Allocation


Spool allocation values:
   CLASS . . . . _                LINECT. . . ___
   DEST. . . . . _____          PRMODE. . . _____
   JES node. . . _____          PRTY. . . . __
   FCB . . . . . ___              SEGMENT . . ____
   FLASH count . ___              THRESHLD. . _____
   FLASH name. . ___              UCS . . . . ___
   FORMS . . . . _____          WRITER. . . _____
   GROUPID . . . _____
   USERDATA
        . . _____ (extend)
   BURST . . . . _  1. Yes  2. No
   HOLD. . . . . _  1. Yes  2. No
   OUTDISP . . . _  1. Purge  2. Leave  3. Keep  4. Hold  5. Write
Values for Separator Pages:
   Address
        . . _____ (extend)
   Building . . _____
   Department . _____
   Name . . . . _____
   Room . . . . _____
   Title  . . . _____
Resource Related Values:
   Form definition . _____
   Character sets  . ___  ___  ___  ___
   Overlay front . . _____   Back . . _____
   Input tray  . . . ___
   Output bin  . . . ____
   Page definition . _____
   Resource library. _____ (extend)
   Image shift x-direction front . . _____   Back . . _____
               y-direction front . . _____   Back . . _____
Error Reporting Values:
   Print error reporting. . _  1. None  2. All  3. Character  4. Position
   Error disposition. . . . _  1. Default  2. Hold  3. Quit
     _ Print error messages
        Maximum messages. . ___
Other Values:
   Notify . . . . . . . _____   at node . . _____
                        _____   at node . . _____
                        _____   at node . . _____
                        _____   at node . . _____
   Checkpoint pages . . ____
   Checkpoint seconds . ____
   Copies . . . . . . . ____
   Copy group . . . . . __  __  __  __  __  __  __  __
   Color map. . . . . . _____
   Com setup member . . _____
   JES form length. . . _____
   Resolution . . . . . ___
   Duplex . . . . . . . _  1. Simplex  2. Duplex  3. Tumble
   Label data pages . . _  1. Yes  2. No
   Restrict printable area . . _  1. Yes  2. No
     _ Table reference characters
```

ISPF Panel for Processing Section or Component

The following screen shows the ISPF panel you use to fill in the Processing section of a printer definition or to create a Processing component.

```
                           Processing

 Document code page . . _____
 Printer code page. . . ISO8859-1_____

 Print Interface Supported Data Formats and Associated Filters:
 Data format:  Filter:
 / Line data    _____(extend)
 / MO:DCA-P     _____(extend)
 / PostScript   _____(extend)
 / Text         aopfiltr.so_____(extend)
 / PCL          _____(extend)
 / PDF          _____(extend)
 / SAP          _____(extend)
 / Other        _____(extend)

 _ Resubmit for filtering

 SCS Conversion:
    Margins:  Top . . . ___   Bottom . . ___    Left . . ___    Right . . ___
    Line length . . . . ___              Page length . . __
    Tabs:  Vertical . . ___  ___  ___  ___  ___  (extend)
           Horizontal . ___  ___  ___  ___  ___  (extend)

 NetSpool PCL Conversion:
    Print density . . . ___
    Line density. . . . __
    Orientation . . . . 1  1. None  2. Portrait  3. Landscape
    _ SCS automatic page orientation

 IP PrintWay Line-to-Text Conversion:
    / Pagination
       Margins:  Top . . _____   Bottom . . _____
       Page height . . . 58_____
       / Print page header

 Maximum document size . _____
 Maximum copies. . . . . _____
 Forms supported . . . . _____ _____ _____ _____ _____
 Duplex supported. . . . / Simplex   / Duplex   / Tumble
 Print-error reporting supported . / Character   / Position

 Input tray name:   Number: (more)    Output bin name:   Number: (more)
 _____    ___              _____    ____
 _____    ___              _____    ____

 IP PrintWay Attributes:
    SOSI mode . . . . . . . . . . _  1. None  2. ASCII  3. Space  4. EBCDIC
    Translation dataset qualifier . _____
    Double-byte translate table . __
        1. BIG5           2. EUCKANJI          3. HANGEUL
        4. IBMKANJI       5. JIS78KJ-ASCII     6. JIS78KJ-JISROMAN
        7. JIS83KJ-ASCII  8. JIS83KJ-JISROMAN  9. KSC5601
       10. SCHINESE      11. SJISKANJI        12. TCHINESE
```

Note: Filter **aopfiltr.so** is automatically displayed in the printer definition only for IP PrintWay printer definitions that use the LPR, Direct sockets, or IPP protocol. This filter is not recommended for PSF for OS/390 printer definitions or for IP PrintWay printer definitions that use the VTAM or e-mail protocol.

ISPF Panel for NetSpool Options Section or Component

The following screen shows the ISPF panel you use to fill in the NetSpool Options section of a printer definition or to create a NetSpool Options component.

```
                              NetSpool Options

Printer definition name . _____


Formatting . . . . 2   1. None  2. Convert to Line  3. Convert to PCL
    Record size . . _____
    RECFM . . . . . _   1. VB  2. VBA  3. VBM
```

ISPF Panel for NetSpool End-of-File Section or Component

The following screen shows the ISPF panel you use to fill in the NetSpool
End-of-File Rules section of a printer definition or to create a NetSpool End-of-File
Rules component.

```
                          NetSpool End-of-File Rules
  Option ===> _____

  Default rules       1 All LUs    2 LU0     3 LU1     4 LU3

  PLU name  _____   5 All LUs    6 LU0     7 LU1     8 LU3
  PLU name  _____   9 All LUs   10 LU0    11 LU1    12 LU3
  PLU name  _____  13 All LUs   14 LU0    15 LU1    16 LU3
  PLU name  _____  17 All LUs   18 LU0    19 LU1    20 LU3
  PLU name  _____  21 All LUs   22 LU0    23 LU1    24 LU3
  PLU name  _____  25 All LUs   26 LU0    27 LU1    28 LU3
  PLU name  _____  29 All LUs   30 LU0    31 LU1    32 LU3
  PLU name  _____  33 All LUs   34 LU0    35 LU1    36 LU3
  PLU name  _____  37 All LUs   38 LU0    39 LU1    40 LU3
  PLU name  _____  41 All LUs   42 LU0    43 LU1    44 LU3
  PLU name  _____  45 All LUs   46 LU0    47 LU1    48 LU3
  PLU name  _____  49 All LUs   50 LU0    51 LU1    52 LU3
  PLU name  _____  53 All LUs   54 LU0    55 LU1    56 LU3
  PLU name  _____  57 All LUs   58 LU0    59 LU1    60 LU3
  PLU name  _____  61 All LUs   62 LU0    63 LU1    64 LU3
  PLU name  _____  65 All LUs   66 LU0    67 LU1    68 LU3
  PLU name  _____  69 All LUs   70 LU0    71 LU1    72 LU3
  PLU name  _____  73 All LUs   74 LU0    75 LU1    76 LU3
  PLU name  _____  77 All LUs   78 LU0    79 LU1    80 LU3
  PLU name  _____  81 All LUs   82 LU0    83 LU1    84 LU3
  PLU name  _____  85 All LUs   86 LU0    87 LU1    88 LU3
  PLU name  _____  89 All LUs   90 LU0    91 LU1    92 LU3
  PLU name  _____  93 All LUs   94 LU0    95 LU1    96 LU3
```

The following ISPF screen lets you enter the end-of-file rule for a PLU name and
LU type.

```
                          NetSpool End of File Rule

  End of file method . _  1. End of bracket  2. End of chain  3. End of session
                          4. String          5. Timer
  Delete form feed . . _  1. None  2. Leading  3. Trailing  4. Both

  String . _____
     / Keep

  Timeout idle interval . . _____    Busy interval . . _____
```

ISPF Panel for IP PrintWay Options Section or Component

The following screen shows the ISPF panel you use to fill in the IP PrintWay section of a printer definition or to create an IP PrintWay Options component.

```
                         IP PrintWay Options

  Retention period:
     Successful. . . . _____      Failure . . _____
  Retry time . . . . . _____
  Retry limit. . . . . ____

  Connection timeout . 30
  Response timeout . . 60
  Exits:
     Begin data set. . _____    End data set. . _____    Record. . _____

  Document header  . . _____(extend)
     / Translate document header
  Document trailer . . _____(extend)
     / Translate document trailer
  Dataset grouping . . 2  1. None  2. Job  3. Concatenate job

  Formatting:
     Line termination. . . . _____
     Transparent data char . 35
     Carriage control type . _  1. None  2. Machine  3. ANSI
     Delete form feed. . . . 1  1. None  2. Leading  3. Trailing  4. Both
     Formatting. . . . . . . _  1. None          2. Standard
                                3. Translate only 4. Use FCB
     PostScript header . . . _  1. Add           2. Ignore
                                3. Landscape      4. Always landscape
     __ Omit line termination at EOF
```

ISPF Panels for Protocol Section or Component

The ISPF panel that you use to fill in the Protocol section of an IP PrintWay printer definition is different for each transmission protocol. You can select one of the following transmission protocols when you add a printer definition: LPR, direct sockets, Internet Printing Protocol (IPP), VTAM, or e-mail. The ISPF panel that you use to create a Protocol component is the same for all transmission protocols.

LPR Protocol

The following screen shows the ISPF panel you use to fill in the Protocol section of a printer definition when you select the LPR protocol.

```
                          LPR Protocol

Printer IP address . _____(extend)
Print queue name . . _____(extend)

LPR Processing Options:
   Mode . . . . . . . . 2  1. Control file first  2. Control file last
                          3. Stream                4. Remote PSF
   _ Optimize copies
   _ Restrict ports
   / Print banner page
        Banner class. . _____
        Banner job name _____(extend)
   Filename . . . . . . _____
   Indent . . . . . . . _____
   Owner. . . . . . . . _____
   Print function . . . f
   Title. . . . . . . . _____(extend)
   Width. . . . . . . . _____
   User options . . . . _____(extend)
```

Direct Sockets Protocol

The following screen shows the ISPF panel you use to fill in the Protocol section of a printer definition when you select the direct-sockets protocol.

```
                     Direct Sockets Protocol

Printer IP address . _____(extend)
Port number. . . . . _____
```
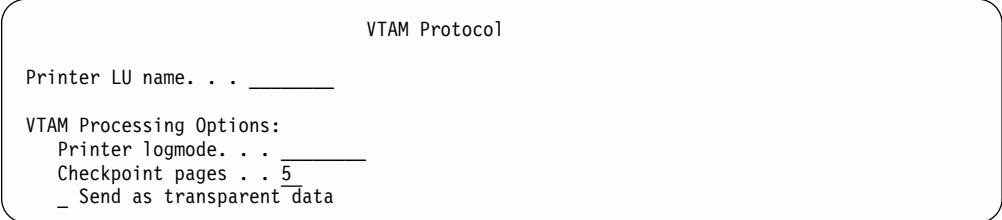
IPP Protocol

The following screen shows the ISPF panel you use to fill in the Protocol section of a printer definition when you select the IPP protocol.

```
                          IPP Protocol

URL. . . . . . . . . _____(extend)
```

VTAM Protocol

The following screen shows the ISPF panel you use to fill in the Protocol section of a printer definition when you select the VTAM protocol.

```
                         VTAM Protocol

Printer LU name. . . _____

VTAM Processing Options:
   Printer logmode. . . _____
   Checkpoint pages . . 5_
   _ Send as transparent data
```
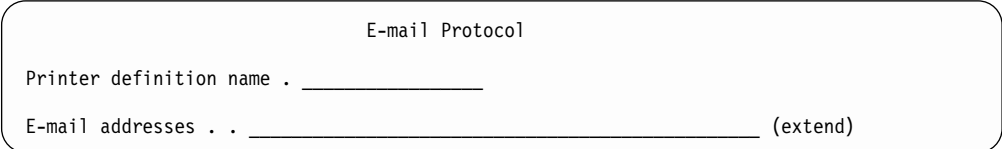
E-mail Protocol

The following screen shows the ISPF panel you use to fill in the Protocol section of a printer definition when you select the e-mail protocol.

```
                         E-mail Protocol

Printer definition name . _____

E-mail addresses . . _____ (extend)
```

Protocol Component

The following screen shows the ISPF panel you use to fill in the Protocol component.

```
                             Protocol

Component name. . . . . . _____
Description . _____

Protocol . . . . . . 1  1. LPR  2. IPP  3. Direct sockets 4. VTAM  5. E-mail
Printer IP address . _____(extend)
Print queue name . . _____(extend)
Port number. . . . . _____
URL. . . . . . . . . _____(extend)
Printer LU name. . . _____
E-mail addresses . . _____(extend)


LPR Processing Options:
   Mode . . . . . . . . 2  1. Control file first  2. Control file last
                           3. Stream              4. Remote PSF
   _ Optimize copies
   _ Restrict ports
   / Print banner page
         Banner class. . _____
         Banner job name _____(extend)
   Filename . . . . . . _____
   Indent . . . . . . . _____
   Owner. . . . . . . . _____
   Print function . . . f
   Title. . . . . . . . _____(extend)
   Width. . . . . . . . _____
   User options . . . . _____(extend)

VTAM Processing Options:
   Printer logmode. . . _____
   Checkpoint pages . . 5
   _ Send as transparent data
```

ISPF Panel for a Printer Pool Definition

The following screen shows the ISPF panel you use to create a printer pool
definition.

```
                          Printer Pool

   Pool name . . . _____
   LU name . . . . _____
   Description . _____ (extend)

   LU classes. . __  __  __  __  __  __    (extend)
   NetSpool end-of-file component . . _____   (list)

   Printer definition names . . _____  _____   (list)
                 _____  _____  _____
                 _____  _____  _____
                 _____  _____  _____
                 _____  _____  _____
                 _____  _____  _____
                 _____  _____  _____
                 _____  _____  _____
                 _____  _____  _____
                 _____  _____  _____
                 _____  _____  _____
                 _____  _____  _____
                 _____  _____  _____
                 _____  _____  _____
                 _____  _____  _____
                 _____  _____  _____
                 _____  _____  _____
                 _____  _____  _____
```

ISPF Panel for IP PrintWay FSS Definition

The following screen shows that ISPF panel you use to create an IP PrintWay FSS definition.

```
                            IP PrintWay FSS

 FSS name. . . _____
 Description . _____(extend)

   _ Old-style translation
 Hiperspace blocks . . _____
 TCP/IP job name . . . _____
 Document code page. . _____
 Applid. . . . . . . . _____
 National language . . 1   1. English  2. Japanese
 Trace mode. . . . . . 1   1. None  2. Internal  3. No printing  4. Full
    __ Trace prompt
    Trace table size . ___
```

ISPF Panel for IP PrintWay FSA Definition

The following screen shows the ISPF panel you use to create an IP PrintWay FSA definition.

```
                            IP PrintWay FSA

 FSA Name. . . _____
 Description . _____(extend)

 Trace mode . . 1  1. None  2. Internal  3. No printing  4. Full
```

Appendix C. Infoprint Manager Options

> **Note**
>
> This appendix describes the programming interface between Infoprint Server for z/OS and Infoprint Manger for AIX and Windows. This interface is subject to change.

This section lists the options that IP PrintWay transmits in the LPD control file to Infoprint Manager for AIX (or PSF for AIX) and to Infoprint Manager for Windows NT. IP PrintWay transmits these options only if you select the **Remote PSF** option in the **Mode** field on the Protocol ISPF panel. See "Printing with Infoprint Manager for AIX or Windows NT" on page 197 for more information.

The **Remote PSF** option is intended to be used when you use IP PrintWay to transmit EBCDIC data. Some of the options are meaningful only if the data set contains non-AFP records, and parameters are created only in that case. Of the other parameters that you can create, some are intended to be used in actual processing of the data set, and others are intended to convey information to be used for the eventual distribution of the printed output.

The full option names are described in the following list. Abbreviations that IP PrintWay uses are given in parentheses.

Some option values (such as address values) can contain embedded blanks. Because a blank is a delimiter for options in the control file, each embedded blank is replaced with the hex value of 1C.

Options Created if Line-Mode Records Exist in the Data Set

-OFILEFORMAT

Set to ″record.″ Indicates that the records are prefixed with length fields.

-OCHARS

Set to the values of the CHARS or UCS parameter if specified on JCL or defaulted by JES. This value can also be specified in an Infoprint Server job attribute and in the printer definition.

-OCC

Set to ″YES″ or ″NO″, depending on whether the data set record format specifies carriage control. This value can also be specified in JCL, in an Infoprint Server job attribute, and in the printer definition.

-OCCTYPE

If the record format specifies carriage control, set to either ″a″ or ″m″, indicating ANSI or machine carriage control. This value can also be specified in JCL, in an Infoprint Server job attribute, and in the printer definition.

-OPAGEDEF

Set to the value of the PAGEDEF or FCB parameter if specified on JCL or defaulted by JES. This value can also be specified in an Infoprint Server job attribute and in the printer definition. A ″P1″ prefix is added to the value if necessary.

-OPRMODE

Set to the value of the PRMODE JCL parameter, only if the value is SOSI1,

SOSI2, or SOSI3; otherwise, this option is not created. This value can also be specified in an Infoprint Server job attribute and in the printer definition.

-OTRC
Set to ″YES″ or ″NO″, based on the value of the TRC parameter. This value can be specified on JCL as TRC=YES, or with the DCB specification: OPTCD=J. It can also be specified in an Infoprint Server job attribute and in the printer definition.

Note: Values from the printer definition are used only if Print Interface or NetSpool allocated the output data set on the JES spool or if the **Resubmit for filtering** field is selected in the printer definition. Values specified by a job submitter, either on JCL or in an Infoprint Server job attribute, always override values specified in the printer definition.

Processing Options Created for All Data Set Types

-ODATATYPE (odatat)
Set to ″line″ (l) if any non-AFP records exist in the data set. (AFP records are identified by the presence of a X'5A' control byte at the beginning of the record.) Otherwise, set to ″afp″ (a).

-OCOPIES (ocop)
Set to the JCL COPIES transmission count. If COPIES is not specified on JCL, in a job attribute, or in the printer definition, the OCOPIES value defaults to 1.

-ODATACK (odatac)
Set to the value of the DATACK parameter if specified on JCL. This value can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, this option is not created.

-ODUPLEX (odu)
Set to the value of the DUPLEX parameter if specified on JCL. This value can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, this option is not created.

-OINTRAY (oin)
Set to the value of the INTRAY parameter if specified on JCL. This value can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, this option is not created.

-OFORMDEF (of)
Set to the value of the FORMDEF parameter if specified on JCL. This value can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, this option is not created. A prefix of X'F1' is added to the value, if necessary, unless the value is ″DUMMY.″

-OOFFSETXB (ooffxb)
Set to the value of the OFFSETXB parameter if specified on JCL. This value can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, this option is not created.

-OOFFSETXF (ooffxf)
Set to the value of the OFFSETXF parameter if specified on JCL. This value can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, this option is not created.

-OOFFSETYB (ooffyb)
Set to the value of the OFFSETYB parameter if specified on JCL. This value

can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, this option is not created.

-OOFFSETYF (ooffyf)
Set to the value of the OFFSETYF parameter if specified on JCL. This value can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, this option is not created.

-OOUTBIN (ooutbin)
Set to the value of the OUTBIN parameter if specified on JCL. This value can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, this option is not created.

-OPASSTHRU (opa)
This option consists of the following sub-options:

-FORMS
Set to the value of the FORMS parameter from JCL or the printer definition. This value can be defaulted by JES.

-CLASS
Set to the value of the CLASS parameter from JCL or the printer definition. This value can be defaulted by JES.

-DESTINATION
Set to the value of the DEST parameter from JCL or the printer definition. This value can be defaulted by JES.

Note: Values from the printer definition are used only if Print Interface or NetSpool allocated the output data set on the JES spool or if the **Resubmit for filtering** field is selected in the printer definition. Values specified by a job submitter always override values specified in the printer definition.

Informational Options Created for All Data Set Types

-OJOBNAME (ojobn)
Set to the JES job name associated with the print data set.

-OUSERID (ous)
Set to the z/OS user id associated with the print data set.

-ONODEID (ono)
Set to the z/OS node id associated with the print data set.

-OPROGRAMMER (opr)
Set to the value of the programmer name from the JCL JOB statement. If not specified, this option is not created.

-OPASSTHRU (opa)
This option can consist of the following sub-option:

-SEGMENTID
Set to the value of the segment id of the print data set, if one exists. If it does not exist, the SEGMENTID sub-option is not included the PASSTHRU option.

-OADDRESS1
Set to the value of the first address subparameter from the ADDRESS parameter if specified on JCL. This value can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, the OADDRESS1 option is not created.

-OADDRESS2

Set to the value of the second address subparameter from the ADDRESS parameter if specified on JCL. This value can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, the OADDRESS2 option is not created.

-OADDRESS3

Set to the value of the third address subparameter from the ADDRESS parameter if specified on JCL. This value can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, the OADDRESS3 option is not created.

-OADDRESS4

Set to the value of the fourth address subparameter from the ADDRESS parameter if specified on JCL. This value can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, the OADDRESS4 option is not created.

-OBUILDING (obu)

Set to the value of the BUILDING parameter if specified on JCL. This value can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, the OBUILDING option is not created.

-ODEPARTMENT (ode)

Set to the value of the DEPT parameter if specified on JCL. This value can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, the ODEPARTMENT option is not created.

-ONAME (ona)

Set to the value of the NAME parameter if specified on JCL. This value can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, the ONAME option is not created.

-OROOM (oro)

Set to the value of the ROOM parameter or the room number from the JOB statement accounting information if specified on JCL. This value can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, the OROOM option is not created.

-OTITLE (oti)

Set to the value of the TITLE parameter if specified on JCL. This value can also be specified in an Infoprint Server job attribute and in the printer definition. If not specified, the OTITLE parameter is not created.

Appendix D. Sample IP PrintWay Printer Definitions

This appendix shows how to fill in Infoprint Server ISPF panels to do the following tasks:

Task	See Page:
Create components for IP PrintWay printer definitions.	389
Create a printer definition for a printer that contains an LPD.	394
Create a printer definition for a printer defined to VTAM.	399
Create a printer definition for an e-mail destination.	403

For information about how to navigate the Infoprint Server ISPF panels to create components and printer definitions, see the following sections:
- "Managing Components" on page 224
- "Managing Printer Definitions" on page 219

Creating Components for IP PrintWay Printer Definitions

This section shows how to fill in ISPF panels to create the following components, which are used by the sample IP PrintWay printer definitions shown in this appendix:
- Allocation component
- Processing component
- IP PrintWay component

In these components, values that might be common to several printer definitions have been specified. Values in the sample components are shown in either normal or bold text:
- Normal text indicates a default value. Default values are displayed automatically in the ISPF panels.
- **Bold** text indicates a value you must explicitly specify in the component.

Allocation Component

This component assumes that the IP PrintWay functional subsystem (FSA) is defined to JES with a work-selection criterion of class K. Therefore, K is specified in the **CLASS** field. Refer to *z/OS Infoprint Server Customization* for information about how to define an IP PrintWay FSA to JES.

```
                         Allocation

Component name. . . . . .printway_____
Description . JES allocation values for IP PrintWay FSA                    

Spool allocation values:
    CLASS . . . . K            LINECT. . . ___
    DEST. . . . . _____      PRMODE. . . _____
    JES node. . . _____      PRTY. . . . __
    FCB . . . . . ___          SEGMENT . . _____
    FLASH count . ___          THRESHLD. . _____
    FLASH name. . ____         UCS . . . . ___
    FORMS . . . . _____      WRITER. . . _____
    GROUPID . . . _____
    USERDATA
        . . _____ (extend)
    BURST . . . . _   1. Yes  2. No
    HOLD. . . . . _   1. Yes  2. No
    OUTDISP . . . _   1. Purge  2. Leave  3. Keep  4. Hold  5. Write
Values for Separator Pages:
    Address
        . . _____ (extend)
    Building . . _____
    Department . _____
    Name . . . . _____
    Room . . . . _____
    Title  . . . _____
Resource Related Values:
    Form definition . _____
    Character sets  . ___   ____   ____  ___
    Overlay front . . _____    Back . . _____
    Input tray  . . . __
    Output bin  . . . ____
    Page definition . _____
    Resource library. _____ (extend)
    Image shift x-direction front . . _____     Back . . _____
                y-direction front . . _____     Back . . _____
Error Reporting Values:
    Print error reporting. . _   1. None  2. All  3. Character  4. Position
    Error disposition. . . . _   1. Default  2. Hold  3. Quit
      _ Print error messages
         Maximum messages. . ___
Other Values:
        Notify . . . . . . . _____   at node . . _____
                             _____   at node . . _____
                             _____   at node . . _____
                             _____   at node . . _____
        Checkpoint pages . . ____
        Checkpoint seconds . ____
        Copies . . . . . . . ____
        Copy group . . . . . __  __  __  __  __  __  __  __
        Color map. . . . . . _____
        Com setup member . . _____
        JES form length. . . _____
        Resolution . . . . . ___
        Duplex . . . . . . . _   1. Simplex  2. Duplex  3. Tumble
        Label data pages . . _   1. Yes  2. No
        Restrict printable area . . _   1. Yes  2. No
          _ Table reference characters
```

Processing Component for PostScript and PCL Printers

Component **postscript/pcl** is suitable for printers that can accept PostScript, PCL, and text data. This component assumes that you have installed the AFP to PostScript transform feature of Infoprint Server Transforms. If you have not installed this feature, do not select the **MO:DCA-P** data format, do not specify the **afp2ps.dll** transform in the **Filter** field, and do not select the **Resubmit for filtering** field.

Values that are filled in the fields under the **SCS Conversion** and **NetSpool PCL Conversion** headings are used only when NetSpool processes input SCS data. If you do not use NetSpool in your installation, these values are ignored.

```
                              Processing

 Component name. . . . . .postscript/pcl
 Description . Data formats and code page for PostScript and PCL pinters

 Document code page . . _____
 Printer code page. . . ISO8859-1_____

 Print Interface Supported Data Formats and Associated Filters:
 Data format:  Filter:
 / Line data   _____ (extend)
 / MO:DCA-P    afp2ps.dll -c US_____  (extend)
 / PostScript  _____ (extend)
 / Text        aopfiltr.so_____  (extend)
 / PCL         _____ (extend)
 _ PDF         _____ (extend)
 _ SAP         _____ (extend)
 _ Other       _____ (extend)

 / Resubmit for filtering

 SCS Conversion:
    Margins:  Top . . . 6__   Bottom . . 62_   Left . . 11_   Right . . 71_
    Line length . . . . 80           Page length . . 66
    Tabs:  Vertical . . ___ ___ ___ ___ ___  (extend)
           Horizontal . ___ ___ ___ ___ ___  (extend)

 NetSpool PCL Conversion:
    Print density . . . 10_
    Line density. . . . 6_
    Orientation . . . . 1_ 1. None  2. Portrait  3. Landscape
    _ SCS automatic page orientation

 IP PrintWay Line-to-Text Conversion:
    / Pagination
       Margins:  Top . . 5_____   Bottom . . 5_____
       Page height . . . 66_____
       / Print page header

 Maximum document size . _____
 Maximum copies. . . . . ____
 Forms supported . . . . _____ _____ _____ _____ _____
 Duplex supported. . . . / Simplex  / Duplex  / Tumble
 Print-error reporting supported . / Character  / Position

 Input tray name:   Number: (more)     Output bin name:   Number: (more)

 _____    ___             _____     ____
 _____    ___             _____     ____

 IP PrintWay Attributes:
    SOSI mode . . . . . . . . . . _  1. None  2. ASCII  3. Space  4. EBCDIC
    Translation dataset qualifier . _____
    Double-byte translate table . __
       1. BIG5          2. EUCKANJI        3. HANGEUL
       4. IBMKANJI      5. JIS78KJ-ASCII   6. JIS78KJ-JISROMAN
       7. JIS83KJ-ASCII 8. JIS83KJ-JISROMAN 9. KSC5601
      10. SCHINESE     11. SJISKANJI       12. TCHINESE
```

Processing Component for VTAM-Controlled Printers

Processing component **vtam** is suitable for a VTAM-controlled printer. Because Infoprint Server can convert text and line data to either SCS or DSC/DSE format, this Processing component accepts both text and line data. Values specified under the **SCS Conversion** heading are used only when IP PrintWay sends SCS data to the printer. If the VTAM-controlled printer accepts the DSC/DSE data stream, instead of the SCS data stream, these values are ignored.

```
                            Processing

Component name. . . . . .vtam_____
Description . Data formats and code page for VTAM-controlled printers_____

Document code page . . _____
Printer code page. . . IBM-1047_____

Print Interface Supported Data Formats and Associated Filters:
Data format:  Filter:
/ Line data    _____(extend)
_ MO:DCA-P     _____(extend)
_ PostScript   _____(extend)
/ Text         _____(extend)
_ PCL          _____(extend)
_ PDF          _____(extend)
_ SAP          _____(extend)
_ Other        _____(extend)

_ Resubmit for filtering

SCS Conversion:
   Margins: Top . . . 6__   Bottom . . 62__  Left . . 11__   Right . . 71_
   Line length . . . . 80___           Page length . . 66__
   Tabs:  Vertical . . ___  ___  ___  ___  ___  (extend)
          Horizontal . ___  ___  ___  ___  ___  (extend)

NetSpool PCL Conversion:
   Print density . . . ___
   Line density. . . . __
   Orientation . . . . 1  1. None  2. Portrait  3. Landscape
   _ SCS automatic page orientation

IP PrintWay Line-to-Text Conversion:
   / Pagination
      Margins:  Top . . _____   Bottom . . _____
      Page height . . . 58_____
      / Print page header

Maximum document size . _____
Maximum copies. . . . . 1____
Forms supported . . . . _____ _____ _____ _____ _____
Duplex supported. . . . / Simplex   _ Duplex   _ Tumble
Print-error reporting supported . _ Character  _ Position

Input tray name:   Number: (more)   Output bin name:   Number: (more)
_____    ___              _____    ____
_____    ___              _____    ____

IP PrintWay Attributes:
   SOSI mode . . . . . . . . . . _  1. None  2. ASCII  3. Space  4. EBCDIC
   Translation dataset qualifier . _____
   Double-byte translate table . __
      1. BIG5            2. EUCKANJI         3. HANGEUL
      4. IBMKANJI        5. JIS78KJ-ASCII    6. JIS78KJ-JISROMAN
      7. JIS83KJ-ASCII   8. JIS83KJ-JISROMAN 9. KSC5601
     10. SCHINESE       11. SJISKANJI       12. TCHINESE
```

IP PrintWay Options Component

This component changes the response timeout value, specifies a retry time and a retry limit for unsuccessful transmissions, and specifies a retain value for failed transmissions. It also specifies 0D25 (CRLF) as the line termination value and selects the **Use FCB** formatting option.

```
                            IP PrintWay Options

  Component name. . . . . .retain-use-fcb
  Description . Retain data sets that fail transmission for one day; use FCB

  Retention period:
     Successful. . . . _____       Failure . . 0024:00:00
  Retry time . . . . . 0000:09:00
  Retry limit. . . . . 3

  Connection timeout . 30
  Response timeout . . 60
  Exits:
     Begin data set. . _____    End data set. . _____    Record. . _____

  Document header  . . _____ _____ (extend)
     / Translate document header
  Document trailer . . _____ (extend)
     / Translate document trailer
  Dataset grouping . . 2  1. None  2. Job  3. Concatenate job

  Formatting:
     Line termination. . . . 0D25
     Transparent data char . 35
     Carriage control type . _  1. None  2. Machine  3. ANSI
     Delete form feed. . . . 1  1. None  2. Leading  3. Trailing  4. Both
     Formatting. . . . . . . 4  1. None           2. Standard
                                3. Translate only  4. Use FCB
     PostScript header . . . _  1. Add            2. Ignore
                                3. Landscape       4. Always landscape
     __ Omit line termination at EOF
```

Creating an IP PrintWay Printer Definition for the LPR Protocol

This section shows how to fill in ISPF panels to create an IP PrintWay printer definition for a remote printer that contains an LPD, for example, an IBM Infoprint 21 printer. IP PrintWay uses the LPR protocol to transmit data to this printer. This printer definition contains values used by Print Interface, NetSpool, and IP PrintWay.

Job submitters can print to this printer by specifying **mypsprinter** as the name of the print queue or printer definition. JCL users can also print to this printer by specifying CLASS=K and DEST=MYPSPRT on an OUTPUT JCL statement. VTAM applications can print to this printer by specifying LUPRT001 as the secondary LU name.

Values on the printer definition panels are shown in either normal or bold text:
- Normal text indicates either a default value or a value that was specified in an included component. Default values and values from the component are displayed automatically in the ISPF panels.
- **Bold** text indicates a value that you must explicitly specify in the printer definition.

This panel includes the Allocation, Processing, and IP PrintWay Options components that were created in the previous examples. The asterisks next to the Allocation and Protocol sections of the printer definition indicate that one or more fields in these sections contain values that are explicitly specified in this printer definition.

```
                        IP PrintWay Printer Definition

 Printer definition name . mypsprinter
 Description . A PostScript and PCL printer                      (extend)
 Location. . . Building 003, office E9-11                        (extend)


                         Component name       Custom values
 Section                 (enter to list)      (enter to customize)
 Allocation          => printway              => *
 Processing          => postscript/pcl        => __
 NetSpool options    => _____      => __
 NetSpool end-of-file => _____     => __
 IP PrintWay options => retain-use-fcb        => __
 Protocol            => _____      => *

 / Use DEST, CLASS, and FORMS for IP PrintWay printer selection
 NetSpool LU name . LUPRT001   LU classes . . 2  __  __  __  __  __  (extend)
```

```
                              Allocation

Printer definition name . mypsprinter

Spool allocation values:
    CLASS . . . . . K            LINECT. . . ___
    DEST. . . . . MYPSPRT        PRMODE. . . _____
    JES node. . . _____       PRTY. . . . __
    FCB . . . . . 8___           SEGMENT . . ____
    FLASH count . ___            THRESHLD. . _____
    FLASH name. . ___            UCS . . . . ___
    FORMS . . . . _____       WRITER. . . _____
    GROUPID . . . _____
    USERDATA
      . . _____ (extend)
    BURST . . . . _   1. Yes  2. No
    HOLD. . . . . _   1. Yes  2. No
    OUTDISP . . . _   1. Purge  2. Leave  3. Keep  4. Hold  5. Write
Values for Separator Pages:
    Address
      . . _____ (extend)
    Building . . . _____
    Department . _____
    Name . . . . _____
    Room . . . . _____
    Title  . . . _____
Resource Related Values:
    Form definition . _____
    Character sets  . ___   ___   ___   ___
    Overlay front . . _____     Back . . _____
    Input tray  . . . ___
    Output bin  . . . ____
    Page definition . _____
    Resource library. _____ (extend)
    Image shift x-direction front . . _____     Back . . _____
                y-direction front . . _____     Back . . _____
Error Reporting Values:
    Print error reporting. . _   1. None  2. All  3. Character  4. Position
    Error disposition. . . . _   1. Default  2. Hold  3. Quit
      _ Print error messages
         Maximum messages. . ___
Other Values:
    Notify . . . . . . . myid____   at node . . mynode__
                         _____    at node . . _____
                         _____    at node . . _____
                         _____    at node . . _____
    Checkpoint pages . . ____
    Checkpoint seconds . ____
    Copies . . . . . . . ____
    Copy group . . . . . __  __  __  __  __  __  __  __
    Color map. . . . . . _____
    Com setup member . . _____
    JES form length. . . _____
    Resolution . . . . . ___
    Duplex . . . . . . . _   1. Simplex  2. Duplex  3. Tumble
    Label data pages . . _   1. Yes  2. No
    Restrict printable area . . _   1. Yes  2. No
      _ Table reference characters
```

```
                          Processing

 Printer definition name .mypsprinter_____

 Document code page . . _____
 Printer code page. . . ISO8859-1_____

 Print Interface Supported Data Formats and Associated Filters:
 Data format:  Filter:
 / Line data    _____ (extend)
 / MO:DCA-P     afp2ps.dll -c US_____ (extend)
 / PostScript   _____ (extend)
 / Text         aopfiltr.so_____ (extend)
 / PCL          _____ (extend)
 _ PDF          _____ (extend)
 _ SAP          _____ (extend)
 _ Other        _____ (extend)

 / Resubmit for filtering

 SCS Conversion:
    Margins:  Top . . . 6__    Bottom . . 62__    Left . . 11__    Right . . 71_
    Line length . . . . 80_             Page length . . 66_
    Tabs:  Vertical . . ___  ___  ___  ___  ___  (extend)
           Horizontal . ___  ___  ___  ___  ___  (extend)

 NetSpool PCL Conversion:
    Print density . . . 10_
    Line density. . . . 6_
    Orientation . . . . 1_  1. None  2. Portrait  3. Landscape
    _ SCS automatic page orientation

 IP PrintWay Line-to-Text Conversion:
    / Pagination
       Margins:  Top . . 5_____     Bottom . . 5_____
       Page height . . . 66_____
       / Print page header

 Maximum document size . _____
 Maximum copies. . . . . ____
 Forms supported . . . . _____ _____ _____ _____ _____
 Duplex supported. . . . / Simplex   / Duplex   / Tumble
 Print-error reporting supported . / Character   / Position

 Input tray name:   Number: (more)   Output bin name:   Number: (more)
 _____     ___              _____     ____
 _____     ___              _____     ____

 IP PrintWay Attributes:
    SOSI mode . . . . . . . . . _  1. None  2. ASCII  3. Space  4. EBCDIC
    Translation dataset qualifier . _____
    Double-byte translate table . __
       1. BIG5          2. EUCKANJI        3. HANGEUL
       4. IBMKANJI      5. JIS78KJ-ASCII   6. JIS78KJ-JISROMAN
       7. JIS83KJ-ASCII 8. JIS83KJ-JISROMAN 9. KSC5601
      10. SCHINESE     11. SJISKANJI       12. TCHINESE
```

Note: When you first view the Processing panel, only filter **aopfiltr.so** is displayed in the **Filter** field for the **Text** data format. You must remove (space over) the name of this filter so that the filters you specified in the **postscript** Processing component are used. After you remove the name of the filter, press Enter to see the filters from the component.

```
                      NetSpool Options

Printer definition name . mypsprinter



Formatting . . . . 3   1. None  2. Convert to line  3. Convert to PCL
   Record size . . _____
   RECFM . . . . . _   1. VB  2. VBA  3. VBM
```

```
                    NetSpool End-of-File Rules
  Option === 1

  Printer definition name . mypsprinter

  Default rules       1 All LUs    2 LU0    3 LU1    4 LU3

  PLU name _____    5 All LUs    6 LU0    7 LU1    8 LU3
  PLU name _____    9 All LUs   10 LU0   11 LU1   12 LU3
  PLU name _____   13 All LUs   14 LU0   15 LU1   16 LU3
  PLU name _____   17 All LUs   18 LU0   19 LU1   20 LU3
  PLU name _____   21 All LUs   22 LU0   23 LU1   24 LU3
  PLU name _____   25 All LUs   26 LU0   27 LU1   28 LU3
  PLU name _____   29 All LUs   30 LU0   31 LU1   32 LU3
  PLU name _____   33 All LUs   34 LU0   35 LU1   36 LU3
  PLU name _____   37 All LUs   38 LU0   39 LU1   40 LU3
  PLU name _____   41 All LUs   42 LU0   43 LU1   44 LU3
  PLU name _____   45 All LUs   46 LU0   47 LU1   48 LU3
  PLU name _____   49 All LUs   50 LU0   51 LU1   52 LU3
  PLU name _____   53 All LUs   54 LU0   55 LU1   56 LU3
  PLU name _____   57 All LUs   58 LU0   59 LU1   60 LU3
  PLU name _____   61 All LUs   62 LU0   63 LU1   64 LU3
  PLU name _____   65 All LUs   66 LU0   67 LU1   68 LU3
  PLU name _____   69 All LUs   70 LU0   71 LU1   72 LU3
  PLU name _____   73 All LUs   74 LU0   75 LU1   76 LU3
  PLU name _____   77 All LUs   78 LU0   79 LU1   80 LU3
  PLU name _____   81 All LUs   82 LU0   83 LU1   84 LU3
  PLU name _____   85 All LUs   86 LU0   87 LU1   88 LU3
  PLU name _____   89 All LUs   90 LU0   91 LU1   92 LU3
  PLU name _____   93 All LUs   94 LU0   95 LU1   96 LU3
```

```
                    NetSpool End of File Rule

  Printer definition name . mypsprinter

  End of file method . 1  1. End of bracket  2. End of chain  3. End of session
                          4. String          5. Timer
  Delete form feed . . 1  1. None  2. Leading  3. Trailing  4. Both

  String . _____
     / Keep

  Timeout idle interval . . _____    Busy interval . . _____
```

```
                        IP PrintWay Options

Printer definition name . mypsprinter

Retention period:
   Successful. . . .  _____       Failure . . 0024:00:00
Retry time . . . . . 0000:09:00
Retry limit. . . . . 3____

Connection timeout . 30
Response timeout . . 60___
Exits:
   Begin data set. .  _____    End data set. .  _____    Record. .  _____

Document header  . . _____  (extend)
   / Translate document header
Document trailer . . _____  (extend)
   / Translate document trailer
Dataset grouping . . 2  1. None   2. Job   3. Concatenate job

Formatting:
   Line termination. . . . 0D25____
   Transparent data char . 35
   Carriage control type . _  1. None   2. Machine   3. ANSI
   Delete form feed. . . . 1  1. None   2. Leading   3. Trailing   4. Both
   Formatting. . . . . . . 4  1. None           2. Standard
                              3. Translate only  4. Use FCB
   PostScript header . . . _  1. Add            2. Ignore
                              3. Landscape      4. Always landscape
   __ Omit line termination at EOF
```

```
                         LPR Protocol

Printer definition name . mypsprinter

Printer IP address . printer1.boulder_____  (extend)
Print queue name . . TEXT_____  (extend)

LPR Processing Options:
   Mode . . . . . . . . 2  1. Control file first  2. Control file last
                          3. Stream              4. Remote PSF

   _ Optimize copies
   _ Restrict ports
   / Print banner page
         Banner class. . _____
         Banner job name _____  (extend)
      Filename . . . . . . _____
      Indent . . . . . . . _____
      Owner. . . . . . . . _____
      Print function . . . f
      Title. . . . . . . . _____  (extend)
      Width. . . . . . . . _____
      User options . . . . _____  (extend)
```

Creating an IP PrintWay Printer Definition for the VTAM Protocol

This section shows how to fill in Infoprint Server ISPF panels to create a printer definition for a VTAM-controlled printer that accepts the SCS data stream, for example, an IBM Infoprint 40 printer. IP PrintWay uses the VTAM protocol to transmit data to this printer. This printer definition contains values used by Print Interface and IP PrintWay.

Job submitters can print to this printer by specifying **myscsprinter** as the name of the print queue or printer definition. JCL users can also print to this printer by specifying CLASS=K and DEST=MYSCSPRT on an OUTPUT JCL statement.

Values in the sample printer definitions are shown in either normal or bold text:
- Normal text indicates either a default value or a value that is specified in an included component. Default values and values from the component are displayed automatically in the ISPF panels.
- **Bold** text indicates a value that you must explicitly specify in the printer definition.

This panel includes the Allocation, Processing, and IP PrintWay Options components that were created in the previous examples. The asterisks next to the Allocation and Protocol sections of the printer definition indicate that one or more fields in these sections contain values that are explicitly specified in this printer definition.

```
                        IP PrintWay Printer Definition

 Printer definition name . myscsprinter
 Description . An SCS printer                                        (extend)
 Location. . . Building 003, office E9-4                             (extend)


                         Component name          Custom values
 Section                 (enter to list)      (enter to customize)
 Allocation           => printway             => *
 Processing           => vtam                 => __
 NetSpool options     => _____     => __
 NetSpool end-of-file => _____     => __
 IP PrintWay options  => retain-use-fcb       => __
 Protocol             => _____     => *


 / Use DEST, CLASS, and FORMS for IP PrintWay printer selection
 NetSpool LU name . _____    LU classes . .    __ __ __ __ __     (extend)
```

```
                              Allocation

Printer definition name . myscsprinter

Spool allocation values:
    CLASS . . . . K             LINECT. . . ___
    DEST. . . . . MYSCSPRT      PRMODE. . . _____
    JES node. . . _____      PRTY. . . . __
    FCB . . . . . 8___          SEGMENT . . _____
    FLASH count . ___           THRESHLD. . _____
    FLASH name. . ____          UCS . . . . ___
    FORMS . . . . _____      WRITER. . . _____
    GROUPID . . . _____
    USERDATA
        . . _____ (extend)
    BURST . . . . _  1. Yes  2. No
    HOLD. . . . . _  1. Yes  2. No
    OUTDISP . . . _  1. Purge  2. Leave  3. Keep  4. Hold  5. Write
Values for Separator Pages:
    Address
        . . _____ (extend)
    Building . . _____
    Department . _____
    Name . . . . _____
    Room . . . . _____
    Title . . . _____
Resource Related Values:
    Form definition . _____
    Character sets . ___  ____  ____  ___
    Overlay front . . _____   Back . . _____
    Input tray  . . . ___
    Output bin  . . . ____
    Page definition . _____
    Resource library. _____ (extend)
    Image shift x-direction front . . _____   Back . . _____
                y-direction front . . _____   Back . . _____
Error Reporting Values:
    Print error reporting. . _  1. None  2. All  3. Character  4. Position
    Error disposition. . . . _  1. Default  2. Hold  3. Quit
      _ Print error messages
        Maximum messages. . ___
Other Values:
    Notify . . . . . . . user1___  at node . . mynode___
                         user2___  at node . . mynode___
                         _____  at node . . _____
                         _____  at node . . _____
    Checkpoint pages . . ____
    Checkpoint seconds . ____
    Copies . . . . . . . ____
    Copy group . . . . . __  __  __  __  __  __  __  __
    Color map. . . . . . _____
    Com setup member . . _____
    JES form length. . . _____
    Resolution . . . . . ___
    Duplex . . . . . . . _  1. Simplex  2. Duplex  3. Tumble
    Label data pages . . _  1. Yes  2. No
    Restrict printable area . . _  1. Yes  2. No
      _ Table reference characters
```

```
                          Processing

Printer definition name . myscsprinter

Document code page . . _____
Printer code page. . . IBM-1047_____

Print Interface Supported Data Formats and Associated Filters:
Data format:  Filter:
/ Line data    _____ (extend)
_ MO:DCA-P     _____ (extend)
_ PostScript   _____ (extend)
/ Text         _____ (extend)
_ PCL          _____ (extend)
_ PDF          _____ (extend)
_ SAP          _____ (extend)
_ Other        _____ (extend)

_ Resubmit for filtering

SCS Conversion:
   Margins:  Top . . . 6__    Bottom . . 62__   Left . . 11_    Right . . 71_
   Line length . . . . 80_              Page length . . 66_
   Tabs:  Vertical . . ___  ___  ___  ___  ___   (extend)
          Horizontal . ___  ___  ___  ___  ___   (extend)

NetSpool PCL Conversion:
   Print density . . . ___
   Line density. . . . __
   Orientation . . . . 1  1. None  2. Portrait  3. Landscape
   _ SCS automatic page orientation

IP PrintWay Line-to-Text Conversion:
   / Pagination
      Margins:  Top . . _____   Bottom . . _____
      Page height . . . 58_____
      / Print page header

Maximum document size . _____
Maximum copies. . . . . 1____
Forms supported . . . . _____ _____ _____ _____ _____
Duplex supported. . . . / Simplex   _ Duplex   _ Tumble
Print-error reporting supported . _ Character   _ Position

Input tray name:   Number: (more)   Output bin name:   Number: (more)
_____    ___             _____     ____
_____    ___             _____     ____

IP PrintWay Attributes:
   SOSI mode . . . . . . . . . . _  1. None  2. ASCII  3. Space  4. EBCDIC
   Translation dataset qualifier . _____
   Double-byte translate table . __
      1. BIG5          2. EUCKANJI         3. HANGEUL
      4. IBMKANJI      5. JIS78KJ-ASCII    6. JIS78KJ-JISROMAN
      7. JIS83KJ-ASCII 8. JIS83KJ-JISROMAN 9. KSC5601
     10. SCHINESE     11. SJISKANJI       12. TCHINESE
```

```
                        IP PrintWay Options

Printer definition name . myscsprinter

Retention period:
   Successful. . . . _____      Failure . . 0024:00:00
Retry time . . . . . 0000:09:00
Retry limit. . . . . 3

Connection timeout . 30
Response timeout . . 60
Exits:
   Begin data set. . _____      End data set. . _____      Record. . _____

Document header  . . _____ (extend)
   / Translate document header
Document trailer . . _____ (extend)
   / Translate document trailer
Dataset grouping . . 2  1. None  2. Job  3. Concatenate job

Formatting:
   Line termination. . . . 0D25
   Transparent data char . 35
   Carriage control type . _  1. None  2. Machine  3. ANSI
   Delete form feed. . . . 1  1. None  2. Leading  3. Trailing  4. Both
   Formatting. . . . . . . 4  1. None           2. Standard
                              3. Translate only  4. Use FCB
   PostScript header . . . _  1. Add            2. Ignore
                              3. Landscape       4. Always landscape
   __ Omit line termination at EOF
```

```
                        VTAM Protocol

Printer definition name . myscsprinter

Printer LU name. . . P002

VTAM Processing Options:
   Printer logmode. . . SCS
   Checkpoint pages . . 5
   _ Send as transparent data
```

Creating an IP PrintWay Printer Definition for the E-mail Protocol

This section shows how to fill in Infoprint Server ISPF panels to create a printer definition for e-mail destinations. This printer definition contains values used by Print Interface, NetSpool, and IP PrintWay.

Job submitters can print to this printer by specifying **deptmail** as the name of the print queue or printer definition. JCL users can also print to this printer by specifying CLASS=K and DEST=DEPTMAIL on an OUTPUT JCL statement. VTAM applications can print to this printer by specifying LU01MAIL as the secondary LU name.

Values in the sample printer definitions are shown in either normal or bold text:

- Normal text indicates either a default value or a value that was specified in an included component. Default values and values from the component are displayed automatically in the ISPF panels when you create a printer definition and include the component.
- **Bold** text indicates that you must explicitly specify the value in the printer definition.

This panel includes an Allocation component that was created in a previous example in this section. The asterisks next to the Allocation, Processing, and Protocol sections of the printer definition indicate that one or more fields in these sections contain values that are explicitly specified in this printer definition.

```
                        IP PrintWay Printer Definition

Printer definition name . deptmail
Description . Mail list for my department                              (extend)
Location. . .                                                          (extend)


                        Component name           Custom values
Section                 (enter to list)        (enter to customize)
Allocation           => printway                  => *
Processing           => _____          => *
NetSpool options     => _____          => __
NetSpool end-of-file => _____          => __
IP PrintWay options  => _____          => __
Protocol             => _____          => *

/ Use DEST, CLASS, and FORMS for IP PrintWay printer selection
NetSpool LU name . LU01MAIL   LU classes . .    __ __ __ __ __         (extend)
```

```
                            Allocation

Printer definition name . deptmail

Spool allocation values:
    CLASS . . . . K              LINECT. . . ___
    DEST. . . . . DEPTMAIL       PRMODE. . . _____
    JES node. . . _____        PRTY. . . . __
    FCB . . . . . ___            SEGMENT . . _____
    FLASH count . __             THRESHLD. . _____
    FLASH name. . ____           UCS . . . . ___
    FORMS . . . . _____        WRITER. . . _____
    GROUPID . . . _____
    USERDATA
      . . _____ (extend)
    BURST . . . . _  1. Yes  2. No
    HOLD. . . . . _  1. Yes  2. No
    OUTDISP . . . _  1. Purge  2. Leave  3. Keep  4. Hold  5. Write
Values for Separator Pages:
    Address
      . . _____ (extend)
    Building . . _____
    Department . _____
    Name . . . . _____
    Room . . . . _____
    Title  . . . My default e-mail title
Resource Related Values:
    Form definition . _____
    Character sets  . ___   ___   ___   ___
    Overlay front . . _____    Back . . _____
    Input tray  . . . ___
    Output bin  . . . ____
    Page definition . _____
    Resource library. _____ (extend)
    Image shift x-direction front . . _____    Back . . _____
               y-direction front . . _____    Back . . _____
Error Reporting Values:
    Print error reporting. . _  1. None  2. All  3. Character  4. Position
    Error disposition. . . . _  1. Default  2. Hold  3. Quit
      _ Print error messages
        Maximum messages. . ___
Other Values:
    Notify . . . . . . . user1___  at node . . mynode___
                         user2___  at node . . mynode___
                         _____   at node . . _____
                         _____   at node . . _____
    Checkpoint pages . . _____
    Checkpoint seconds . _____
    Copies . . . . . . . _____
    Copy group . . . . . __  __  __  __  __  __  __  __
    Color map. . . . . . _____
    Com setup member . . _____
    JES form length. . . _____
    Resolution . . . . . ___
    Duplex . . . . . . . _  1. Simplex  2. Duplex  3. Tumble
    Label data pages . . _  1. Yes  2. No
    Restrict printable area . . _  1. Yes  2. No
      _ Table reference characters
```

```
                         Processing

  Printer definition name . deptmail_____

  Document code page . . _____
  Printer code page. . . IBM-1047_____

  Print Interface Supported Data Formats and Associated Filters:
  Data format:  Filter:
  / Line data    _____ (extend)
  / MO:DCA-P     _____ (extend)
  / PostScript   _____ (extend)
  / Text         _____ (extend)
  / PCL          _____ (extend)
  / PDF          _____ (extend)
  _ SAP          _____ (extend)
  / Other        _____ (extend)

  _ Resubmit for filtering

  SCS Conversion:
     Margins:  Top . . . ___    Bottom . . ___    Left . . ___    Right . . ___
     Line length . . . . ___            Page length . . ___
     Tabs:  Vertical . . ___  ___  ___  ___  ___   (extend)
            Horizontal . ___  ___  ___  ___  ___   (extend)

  NetSpool PCL Conversion:
     Print density . . . ___
     Line density. . . . __
     Orientation . . . . 1  1. None  2. Portrait  3. Landscape
     _ SCS automatic page orientation

  IP PrintWay Line-to-Text Conversion:
     / Pagination
        Margins:  Top . . _____    Bottom . . _____
        Page height . . . 58_____
        _ Print page header

  Maximum document size . _____
  Maximum copies. . . . . __
  Forms supported . . . . _____  _____  _____  _____  _____
  Duplex supported. . . . / Simplex   / Duplex   / Tumble
  Print-error reporting supported . _ Character   _ Position

  Input tray name:   Number: (more)   Output bin name:   Number: (more)
  _____     ___              _____     ____
  _____     ___              _____     ____

  IP PrintWay Attributes:
     SOSI mode . . . . . . . . . . _  1. None  2. ASCII  3. Space  4. EBCDIC
     Translation dataset qualifier . _____
     Double-byte translate table . __
        1. BIG5           2. EUCKANJI        3. HANGEUL
        4. IBMKANJI       5. JIS78KJ-ASCII   6. JIS78KJ-JISROMAN
        7. JIS83KJ-ASCII  8. JIS83KJ-JISROMAN 9. KSC5601
       10. SCHINESE      11. SJISKANJI       12. TCHINESE
```

```
                         NetSpool Options

  Printer definition name . deptmail_____


  Formatting . . . . 2  1. None  2. Convert to line  3. Convert to PCL
     Record size . . _____
     RECFM . . . . . _  1. VB  2. VBA  3. VBM
```

```
                      NetSpool End-of-File Rules
Option ===  1

Printer definition name . deptmail

Default rules       1 All LUs    2 LU0    3 LU1    4 LU3

PLU name  _____   5 All LUs    6 LU0    7 LU1    8 LU3
PLU name  _____   9 All LUs   10 LU0   11 LU1   12 LU3
PLU name  _____  13 All LUs   14 LU0   15 LU1   16 LU3
PLU name  _____  17 All LUs   18 LU0   19 LU1   20 LU3
PLU name  _____  21 All LUs   22 LU0   23 LU1   24 LU3
PLU name  _____  25 All LUs   26 LU0   27 LU1   28 LU3
PLU name  _____  29 All LUs   30 LU0   31 LU1   32 LU3
PLU name  _____  33 All LUs   34 LU0   35 LU1   36 LU3
PLU name  _____  37 All LUs   38 LU0   39 LU1   40 LU3
PLU name  _____  41 All LUs   42 LU0   43 LU1   44 LU3
PLU name  _____  45 All LUs   46 LU0   47 LU1   48 LU3
PLU name  _____  49 All LUs   50 LU0   51 LU1   52 LU3
PLU name  _____  53 All LUs   54 LU0   55 LU1   56 LU3
PLU name  _____  57 All LUs   58 LU0   59 LU1   60 LU3
PLU name  _____  61 All LUs   62 LU0   63 LU1   64 LU3
PLU name  _____  65 All LUs   66 LU0   67 LU1   68 LU3
PLU name  _____  69 All LUs   70 LU0   71 LU1   72 LU3
PLU name  _____  73 All LUs   74 LU0   75 LU1   76 LU3
PLU name  _____  77 All LUs   78 LU0   79 LU1   80 LU3
PLU name  _____  81 All LUs   82 LU0   83 LU1   84 LU3
PLU name  _____  85 All LUs   86 LU0   87 LU1   88 LU3
PLU name  _____  89 All LUs   90 LU0   91 LU1   92 LU3
PLU name  _____  93 All LUs   94 LU0   95 LU1   96 LU3
```

```
                      NetSpool End of File Rule

Printer definition name . deptmail

End of file method . 1  1. End of bracket  2. End of chain  3. End of session
                        4. String          5. Timer
Delete form feed . . 1  1. None  2. Leading  3. Trailing  4. Both

String . _____
   / Keep

Timeout idle interval . . _____    Busy interval . . _____
```

```
                           IP PrintWay Options

Printer definition name . **deptmail**_____

Retention period:
   Successful. . . . _____      Failure . . _____
Retry time . . . . . _____
Retry limit. . . . . ____

Connection timeout . 30
Response timeout . . **60**___
Exits:
   Begin data set. . _____    End data set. . _____    Record. . _____

Document header  . . _____ (extend)
   / Translate document header
Document trailer . . _____ (extend)
   / Translate document trailer
Dataset grouping . . 2  1. None  2. Job  3. Concatenate job

Formatting:
   Line termination. . . . _____
   Transparent data char . 35
   Carriage control type . _  1. None  2. Machine  3. ANSI
   Delete form feed. . . . 1  1. None  2. Leading  3. Trailing  4. Both
   Formatting. . . . . . . _  1. None          2. Standard
                             3. Translate only  4. Use FCB
   PostScript header . . . _  1. Add           2. Ignore
                             3. Landscape      4. Always landscape
   __ Omit line termination at EOF
```

```
                           E-mail Protocol

Printer definition name . **deptmail**_____

E-mail addresses . . **jose@xyz.com,mary@xyz.com,deptlist**_____ (extend)
```

Appendix E. Accessibility

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use software products successfully. The major accessibility features in z/OS enable users to:

- Use assistive technologies such as screen-readers and screen magnifier software
- Operate specific or equivalent features using only the keyboard
- Customize display attributes such as color, contrast, and font size

Using Assistive Technologies

Assistive technology products, such as screen-readers, function with the user interfaces found in z/OS. Consult the assistive technology documentation for specific information when using it to access z/OS interfaces.

Keyboard Navigation of the User Interface

Users can access z/OS user interfaces using TSO/E or ISPF. Refer to *z/OS TSO/E Primer*, *z/OS TSO/E User's Guide*, and *z/OS ISPF User's Guide Volume I* for information about accessing TSO/E and ISPF interfaces. These guides describe how to use TSO/E and ISPF, including the use of keyboard shortcuts or function keys (PF keys). Each guide includes the default settings for the PF keys and explains how to modify their functions.

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Bibliography

This section lists publications that may be helpful to you as you configure and use Infoprint Server.

Infoprint Server

Title	Order Number
Infoprint Server Transforms Licensed Program Specifications	G544-5797
z/OS Infoprint Server Customization	S544-5744
z/OS Infoprint Server Introduction	S544-5742
z/OS Infoprint Server Messages and Diagnosis	G544-5747
z/OS Infoprint Server Migration	G544-5743
z/OS Infoprint Server Operation and Administration	S544-5745
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Infoprint Server for z/OS Implementation Redbook	SG24–6234

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AFP Conversion and Indexing Facility: User's Guide	S544-5285
PSF for OS/390 & z/OS: Customization	S544-5622
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PSF for OS/390 & z/OS: Introduction	G544-5625
PSF for OS/390 & z/OS: Messages and Codes	G544-5627
PSF for OS/390 & z/OS: User's Guide	S544-5630

Advanced Function Presentation (AFP)

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IBM Printing Systems: Printer Information	S544-5750
IBM Printing Systems: Printer Summary	S544-5749
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IBM AFP Fonts: Font Summary for AFP Font Collection	S544-5633
IBM AFP Fonts: Font Summary for AFP Font Collection	S544-5633
IBM Data Stream and Object Arcitectures: Bar Code Object Content Architecture Reference	S544–3766
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IBM Infoprint Manager for AIX: Administrator's Guide	S544-5595

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z/OS C/C++ Run-Time Library Reference	SA22-7821
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z/OS Communications Server: IP Configuration Guide	SC31-8775
z/OS Communications Server: IP Configuration Reference	SC31-8776
z/OS Communications Server: IP Migration	GC31-8773
z/OS Communications Server: SNA Diagnosis Vol 1 Techniques and Procedures	LY43-0088
z/OS Communications Server: SNA Diagnosis Vol 2 FFST Dumps and the VIT	LY43-0089
z/OS Communications Server: SNA Messages	SC31-8790
z/OS Communications Server: SNA Network Implementation Guide	SC31-8777
z/OS Communications Server: SNA Operation	SC31-8779
z/OS Communications Server: SNA Programming	SC31-8829
z/OS Communications Server: SNA Resource Definition Reference	SC31-8778
z/OS Distributed File Service SMB Administration	SC24-5918
z/OS Information Roadmap	SA22-7500
z/OS ISPF Dialog Developer's Guide and Reference	SC34-4821
z/OS JES2 Commands	SA22-7526
z/OS JES2 Initialization and Tuning Guide	SA22-7532
z/OS JES2 Initialization and Tuning Reference	SA22-7533
z/OS JES3 Commands	SA22-7540
z/OS JES3 Initialization and Tuning Guide	SA22-7549
z/OS JES3 Initialization and Tuning Reference	SA22-7550
z/OS Language Environment Debugging Guide	GA22-7560
z/OS Language Environment Run-Time Messages	SA22-7566
z/OS Language Environment Programming Guide	SA22-7561
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z/OS Program Directory	GI10-0670
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IBM 3270 Kanji Data Streams	GA18–2980

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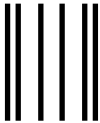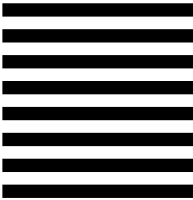Address

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